

DETAIL NO.	CATEGORY	DETAIL NAME
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SEWER DETAILS

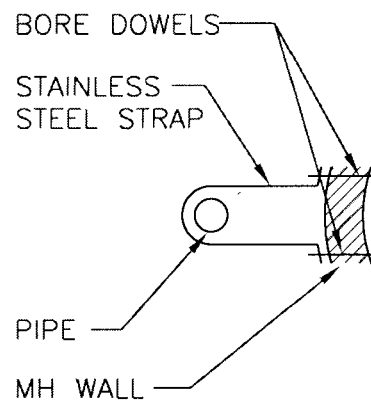
CS 01	SEWER	STANDARD D.I. DROP CONNECTION FOR BRICK EXISTING MANHOLE
CS 02	SEWER	STANDARD BRICK M.H. USING D.I. PIPE 3 FEET DEEP OR LESS
CS 03	SEWER	STANDARD PRECAST SEWER MANHOLE
CS 04	SEWER	SHALLOW PRECAST SEWER MANHOLE (FOR MANHOLES LESS THAN OR EQUAL TO 5'-0" (INVERT TO TOP OF CASTING) BUTYL - TITE JOINT SEALANT INSTALLATION
CS 05	SEWER	STANDARD PRECAST SEWER DROP MANHOLE
CS 06	SEWER	STANDARD 30" MANHOLE CASTING & COVERING
CS 07	SEWER	STEP FOR PRECAST MANHOLES
CS 08	SEWER	ALLOWABLE ANGLES FOR PRECAST MANHOLES
CS 09	SEWER	STANDARD MAINLINE CLEANOUT CONNECTION
CS 10	SEWER	MAINLINE CLEANOUT CASTING AND COVER
CS 11	SEWER	TYPICAL WYE /LATERAL LAYOUT AND PROPERTY LINE CLEANOUT
CS 12	SEWER	PROPERTY LINE CLEANOUT
CS 13	SEWER	EMERGENCY PUMP CONNECTION
CS 14	SEWER	FORCE MAIN DISCHARGE CONNECTION
CS 15	SEWER	PRECAST CONCRETE VALVE VAULT

WATER DETAILS

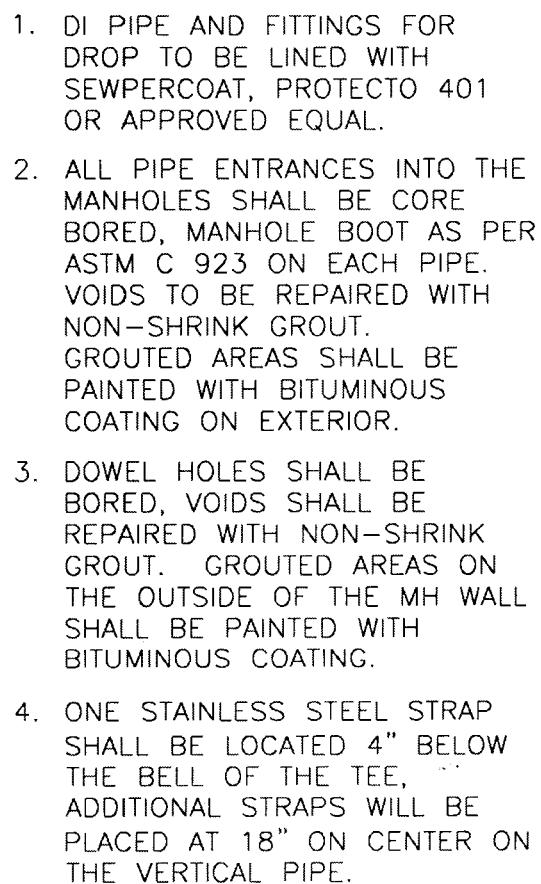
CW 01	WATER	TYPICAL TAP INSTALLATION
CW 02	WATER	WATER METER BOX AND COVER
CW 03	WATER	WATER METER VAULT & TOP
CW 04	WATER	FIRE HYDRANT INSTALLATION
CW 05	WATER	FIRE HYDRANT CONNECTION
CW 06	WATER	LOWERING WATER MAIN OR NEW CONSTRUCTION

WATER AND SEWER DETAILS

CWS 01	WATER/SEWER	LARGE VALVE BOX (FOR MAINS 8 INCHES AND LARGER)
CWS 02	WATER/SEWER	SMALL GATE VALVE BOX (FOR MAINS UP TO 6 INCHES)
CWS 03	WATER/SEWER	AIR VENT / BLOW-OFF VALVE
CWS 04	WATER/SEWER	BACKFILL METHODS
CWS 05	WATER/SEWER	REQUIRED COVER OVER PIPE
CWS 06	WATER/SEWER	MAXIMUM PERMISSIBLE DEFLECTION IN LAYING MECHANICAL - JOINT PIPE
CWS 07A	WATER/SEWER	WATER LINE CASTING
CWS 07B	WATER/SEWER	CASTING LEAK DETECTOR OPTIONS 1 & 2
CWS 07C	WATER/SEWER	WATER & FM CASTING REQUIREMENT



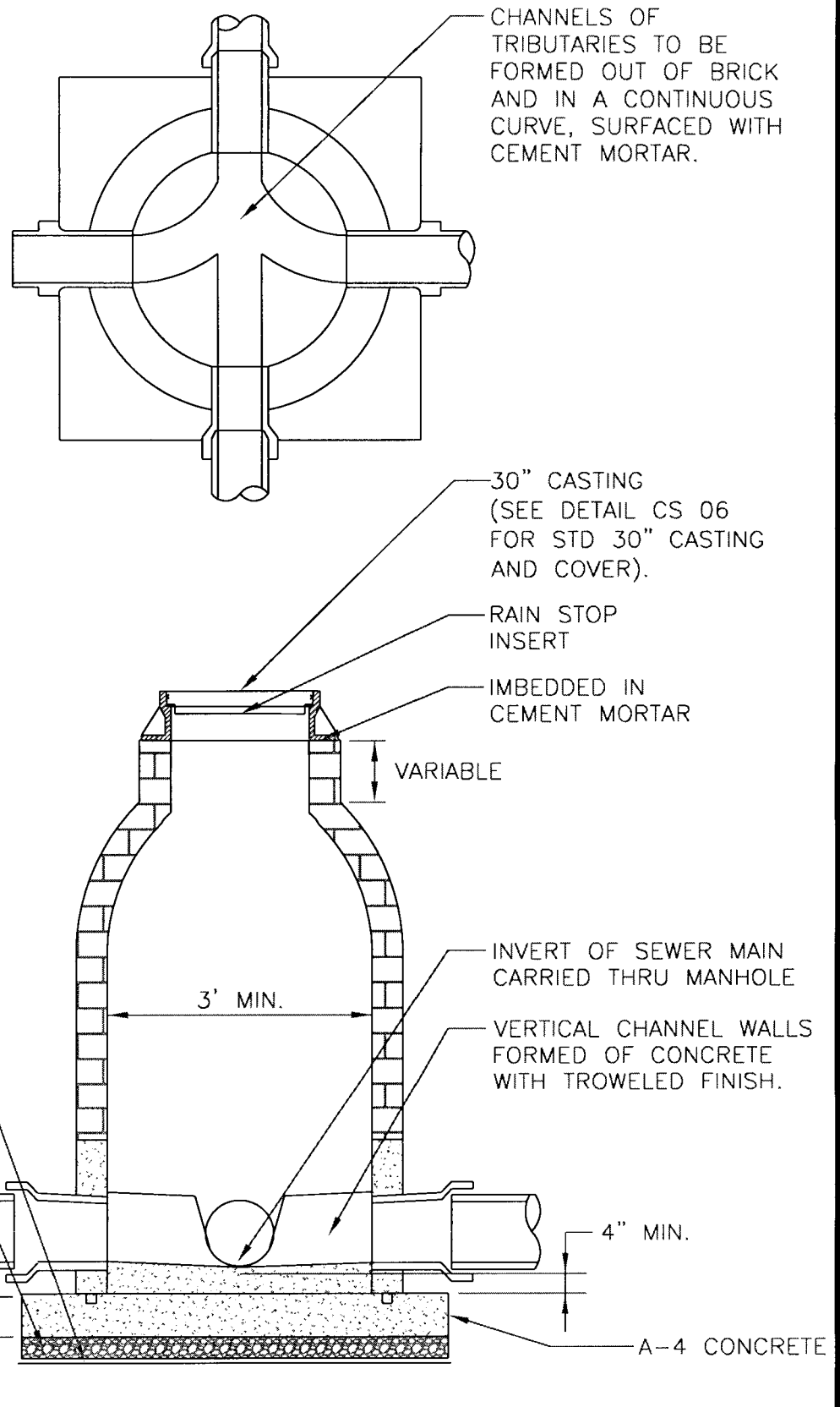
NOTES:



	CITY OF NORFOLK – DEPARTMENT OF UTILITIES STANDARD DETAILS	SCALE: NOT TO SCALE
	STANDARD D.I. DROP CONNECTION FOR EXISTING BRICK MANHOLE	DRAWING NO. CS 01
DATE: 07/07		

NOTES:

1. MH'S TO HAVE 8" WALL THICKNESS.
2. HARD SOUND COMMON BRICK TO BE LAID IN 1-3 CEMENT MORTAR. SHOVED JOINTS NOT TO EXCEED 3/8" THICK. EXTERIOR FACES TO BE PLASTERED WITH 1-2 CEMENT MORTAR & BITUMINOUS COATING.
3. NO HAND-MIXED CONCRETE WILL BE ALLOWED ON THE JOB. ONLY READY MIXED A4000 CONCRETE WILL BE USED.



CITY OF NORFOLK - DEPARTMENT OF UTILITIES
STANDARD DETAILS

SCALE:
NOT TO SCALE

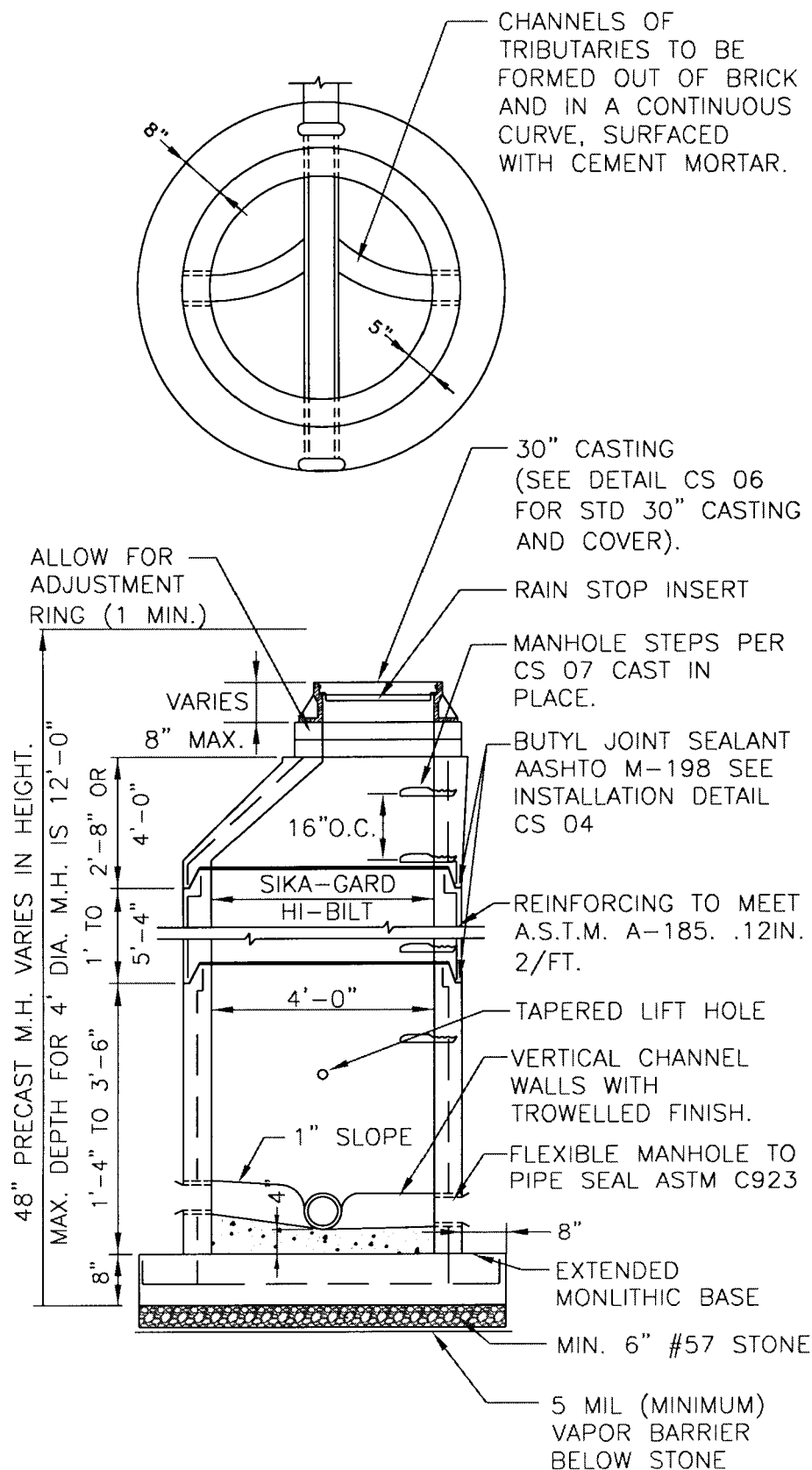
STANDARD BRICK M.H. USING D.I. PIPE
3 FEET DEEP OR LESS

DRAWING NO.
CS 02

DATE: 07/07

REQUIREMENTS:

1. MANHOLE SHALL MEET ALL REQUIREMENTS OF ASTM C478.
2. CONCRETE SHALL BE 4000 PSI COMPRESSIVE STRENGTH MINIMUM.
3. REINFORCING FABRIC SHALL MEET ASTM A185.
4. BASES SHALL BE EXTENDED MONOLITHIC TYPE.
5. MAX. HEIGHT FOR 48" M.H. SHALL NOT EXCEED 12'. WHEN THE MANHOLE IS OVER 12' DEEP, THE BOTTOM 6' (MINIMUM) SHALL BE 60" IN DIAMETER.
6. ALL MANHOLE WALLS SHALL RECEIVE INSIDE APPLICATION OF SIKAGARD HI-BILT OR APPROVED EQUAL APPLIED IN ACCORDANCE WITH MANUFACTURERS SPEC.
7. JOINTS, LIFT HOLES & CHIPS TO BE POINTED WITH NONSHRINK GROUT AND COATED WITH SIKAGARD HI-BILT OR APPROVED EQUAL ON INSIDE WALL, AND PAINTED WITH BITUMINOUS COATING ON OUTSIDE WALL.
8. BUTYL JOINT SEALANT SHALL MEET ALL REQUIREMENTS OF ASTM C443 OR APPROVED EQUAL.
9. MANHOLE STEPS SHALL BE AS PER CITY STANDARD CS 07.
10. STANDARD INVERT ELEVATION OF NO GREATER THAN 1.99' DIFFERENCE SHOULD BE DESIGN CRITERIA. IF EQUAL TO OR GREATER THAN 2' AN OUTSIDE DROP CONNECTION IS REQUIRED.



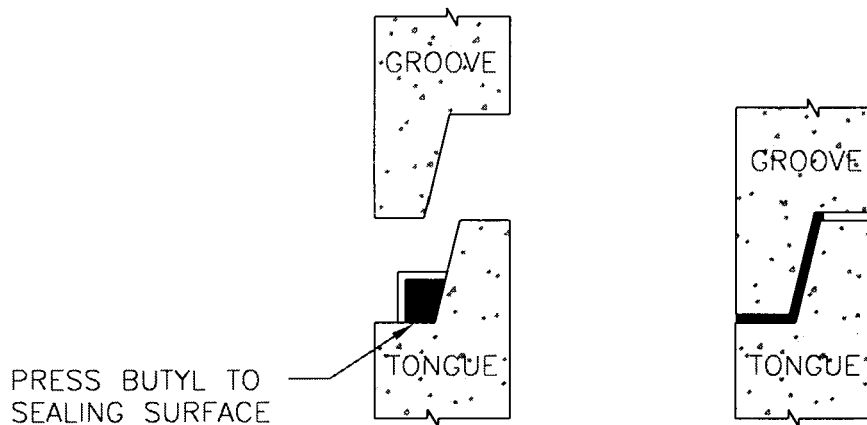
CITY OF NORFOLK – DEPARTMENT OF UTILITIES
STANDARD DETAILS

SCALE:
NOT TO SCALE

STANDARD PRECAST SEWER MANHOLE

DRAWING NO.
CS 03

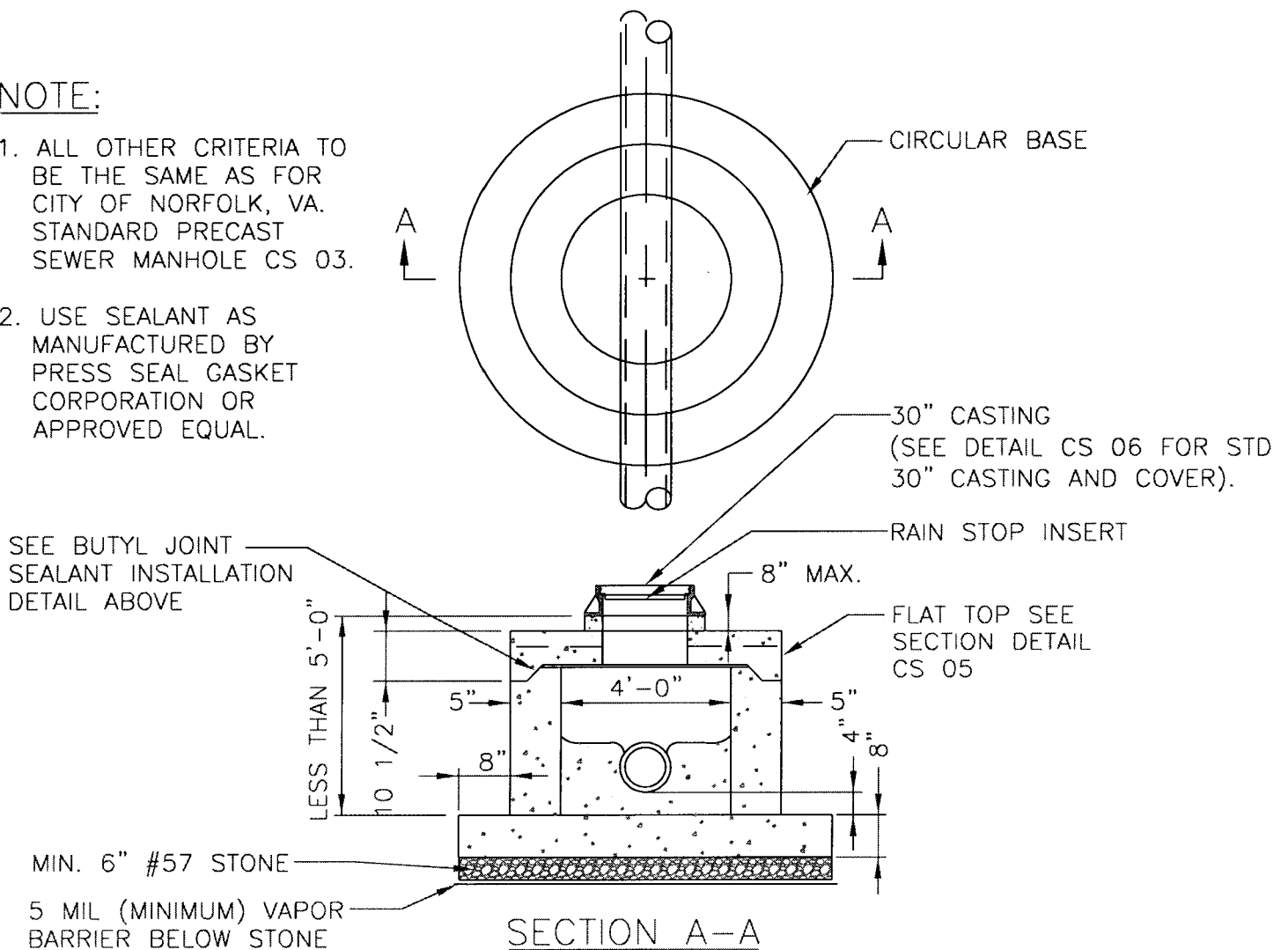
DATE: 07/07



BUTYL JOINT SEALANT INSTALLATION

NOTE:

1. ALL OTHER CRITERIA TO BE THE SAME AS FOR CITY OF NORFOLK, VA. STANDARD PRECAST SEWER MANHOLE CS 03.
2. USE SEALANT AS MANUFACTURED BY PRESS SEAL GASKET CORPORATION OR APPROVED EQUAL.



CITY OF NORFOLK – DEPARTMENT OF UTILITIES
STANDARD DETAILS

SCALE:
NOT TO SCALE

SHALLOW PRECAST SEWER MANHOLE
FOR MANHOLES LESS THAN OR EQUAL TO 5'-0" (INVERT TO TOP OF CASTING)
BUTYL JOINT SEALANT INSTALLATION

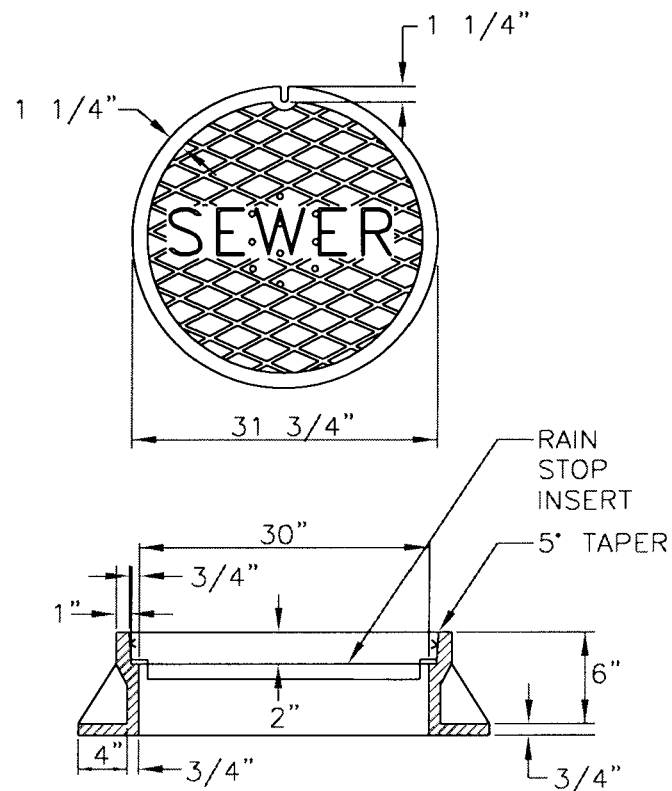
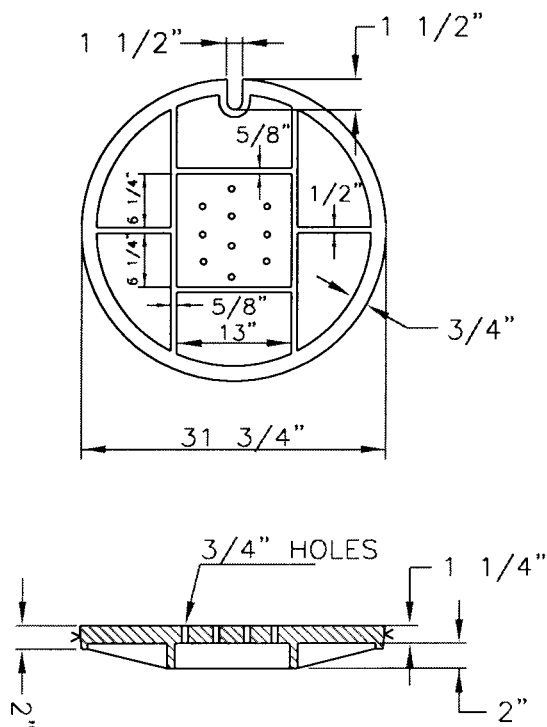
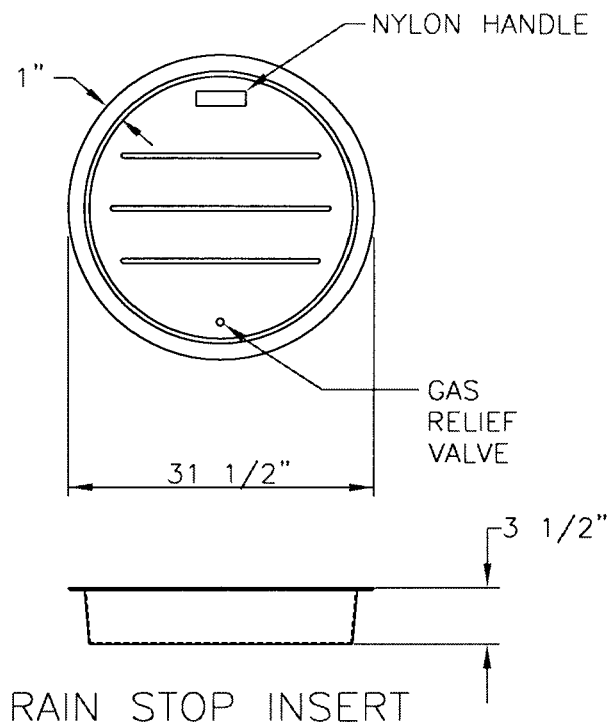
DRAWING NO.
CS 04

DATE: 07/07

	CITY OF NORFOLK – DEPARTMENT OF UTILITIES STANDARD DETAILS	SCALE: NOT TO SCALE
	STANDARD PRECAST SEWER DROP MANHOLE	DRAWING NO. CS 05
DATE: 07/07		

NOTES:

1. LARGE LETTERS IN CENTER OF COVER SHALL BE SEWER OR AS SPECIFIED IN ORDER.
2. CAST IRON SHALL BE 35,000 P.S.I. ATSM A48 CLASS 35B
3. CASTING AND COVER IS TO BE MACHINED TO INSURE A FIRM TIGHT FIT.
4. RAIN STOP INSERT - OF 304 STAINLESS STEEL W/ NITRILE GAS RELIEF VALVE, 1" WEBBED NYLON HANDLE, AND CLOSED CELL NEOPRENE GASKET.



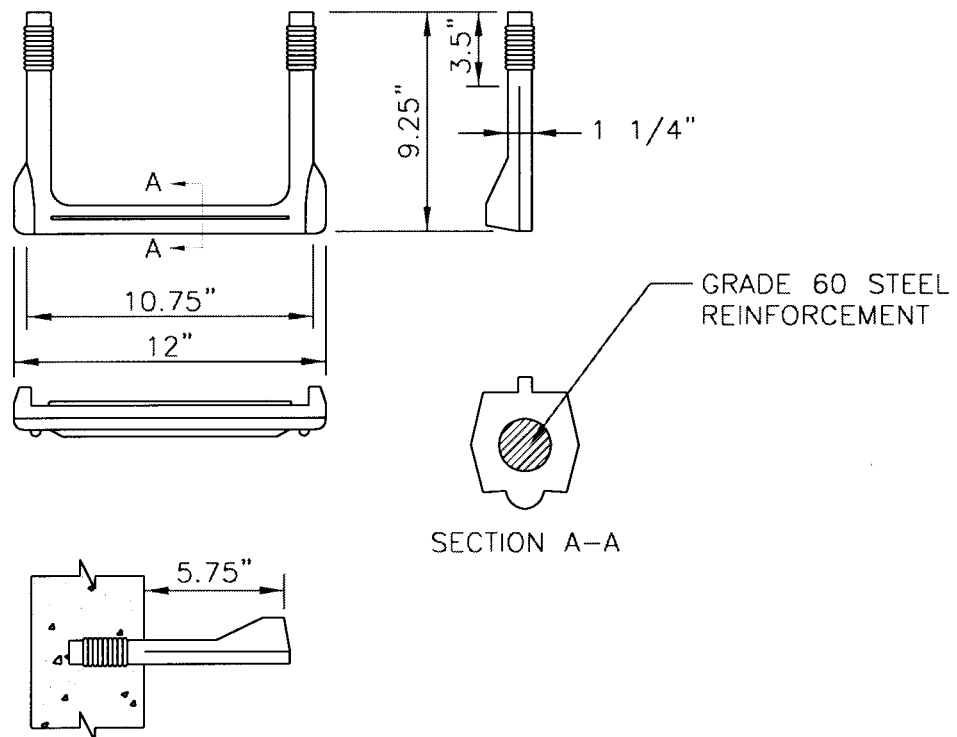
CITY OF NORFOLK - DEPARTMENT OF UTILITIES
STANDARD DETAILS

SCALE:
NOT TO SCALE

STANDARD 30" MANHOLE CASTING & COVER

DRAWING NO.
CS 06

DATE: 03/07



NOTE:

1. COPOLYMER POLYPROPYLENE WITH $\frac{1}{2}$ " GRADE 60 STEEL REINFORCEMENT AS MANUFACTURED BY MA INDUSTRIES PS1-PF OR AMERICAN STEP CO, INC ML-10 OR APPROVED EQUAL.

CITY OF NORFOLK – DEPARTMENT OF UTILITIES
STANDARD DETAILS

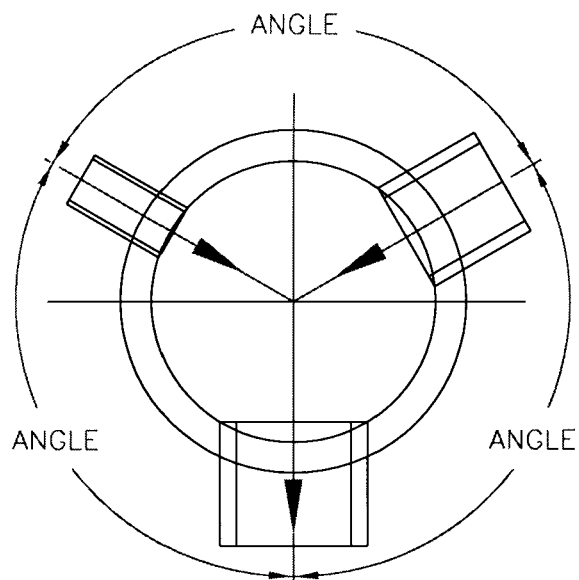
SCALE:
NOT TO SCALE

STEP FOR PRECAST MANHOLES

DRAWING NO.
CS 07

DATE: 03/07

NOMINAL PIPE SIZE	48" DIAMETER MANHOLE					
	12"	15"	18"	21"	24"	27"
12"	59°	55°	70°	76°	80°	87°
15"		70°	75°	80°	85°	92°
18"			81°	87°	90°	98°
21"				93°	96°	105°
24"					100°	107°
27"						114°



NOMINAL PIPE SIZE	60" DIAMETER MANHOLE									
	12"	15"	18"	21"	24"	27"	30"	33"	36"	42"
12"	47°	50°	55°	60°	62°	66°	72°	78°	82°	105°
15"		55°	60°	63°	66°	71°	76°	81°	85°	110°
18"			63°	68°	70°	75°	80°	85°	90°	112°
21"				72°	75°	80°	85°	90°	95°	115°
24"					77°	81°	87°	95°	100°	118°
27"						85°	91°	97°	102°	125°
30"							95°	102°	105°	128°
33"								108°	110°	133°
36"									115°	140°
42"										160°

NOTES:

1. THE ABOVE ANGLES ARE TO BE MAINTAINED FOR THE STRUCTURAL INTEGRITY OF THE MANHOLES. SMALLER ANGLES MAY BE ALLOWED WITH PRIOR APPROVAL FROM THE DEPARTMENT.
2. FOR LARGER PIPE SIZES AND LARGER MANHOLES, SUBMIT DESIGN CALCULATIONS AND CERTIFICATION FROM THE PRECAST MANHOLE MANUFACTURER.

CITY OF NORFOLK – DEPARTMENT OF UTILITIES
STANDARD DETAILS

SCALE:
NOT TO SCALE

ALLOWABLE ANGLES FOR PRECAST MANHOLES

DRAWING NO.
CS 08

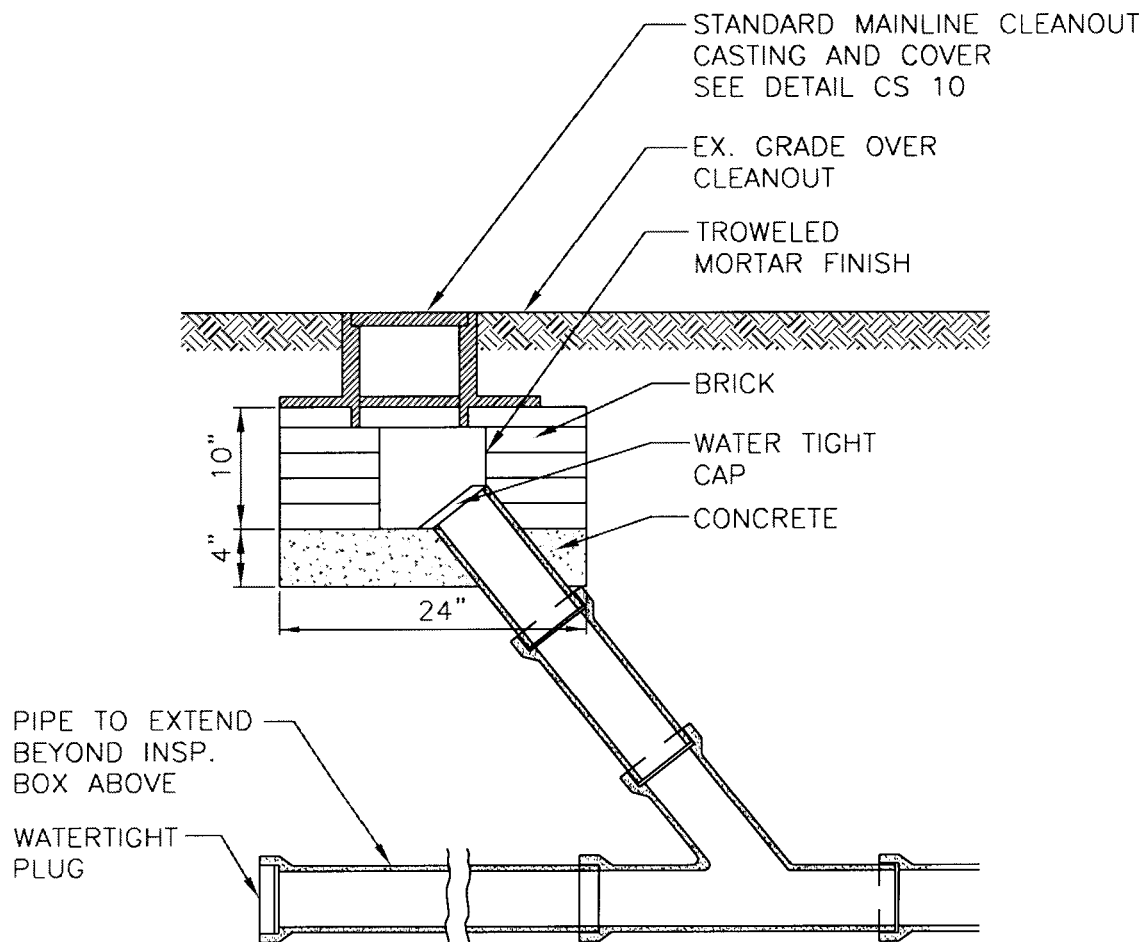
DATE: 03/07

NOTE:

1. CAST IRON TOPS & FRAMES SHALL BE SUFFICIENTLY TRUE TO A PLANE SURFACE, SO THAT TOPS WILL NOT ROCK.
2. RISER MATERIAL TO MATCH MAIN MATERIAL.

GENERAL SPECIFICATIONS:

1. CAST IRON FRAME AND COVER SHALL BE 35,000 PSI. ASTM A48



CITY OF NORFOLK – DEPARTMENT OF UTILITIES
STANDARD DETAILS

SCALE:
NOT TO SCALE

STANDARD MAINLINE CLEANOUT CONNECTION

DRAWING NO.
CS 09

DATE: 03/07

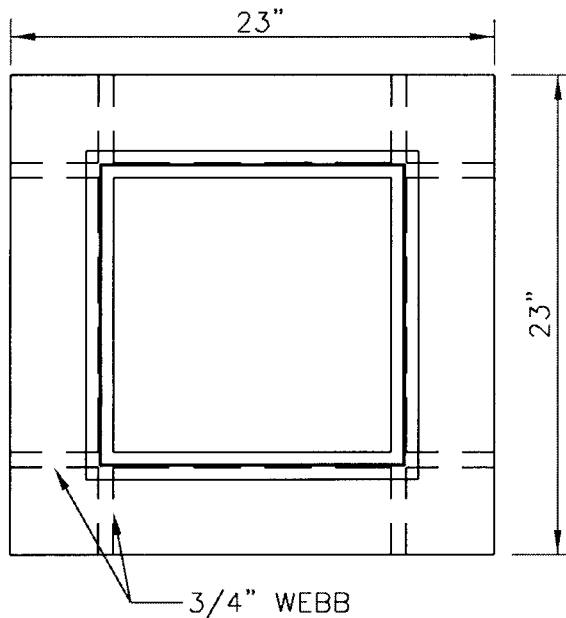
NOTE:

1. LETTER ON COVER SHALL BE "S".

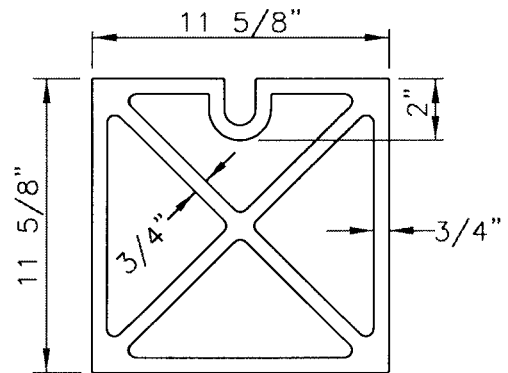
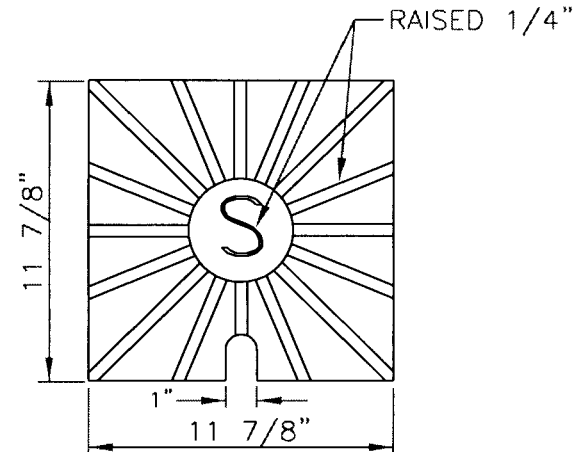
GENERAL SPECIFICATIONS

1. CAST IRON SHALL BE 35,000 PSI

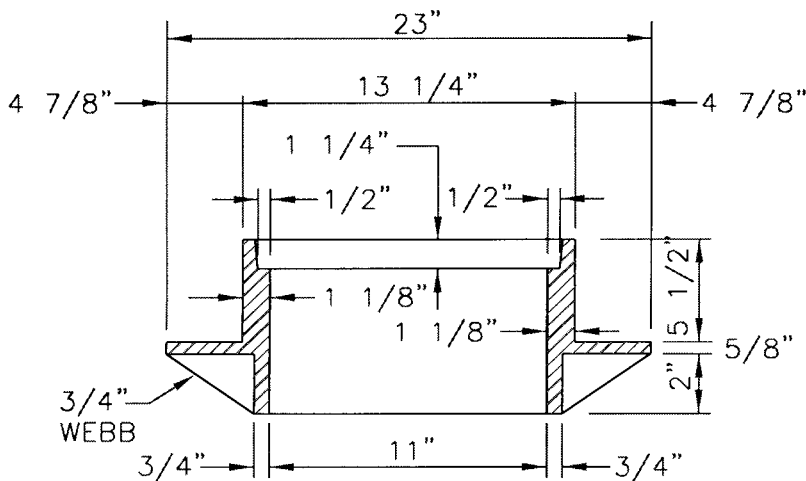
2. ASTM A48 CLASS 35B



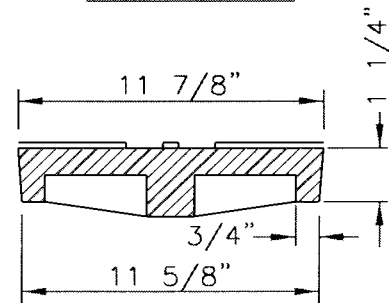
PLAN VIEW



PLAN VIEW
VALVE LID



PROFILE



PROFILE

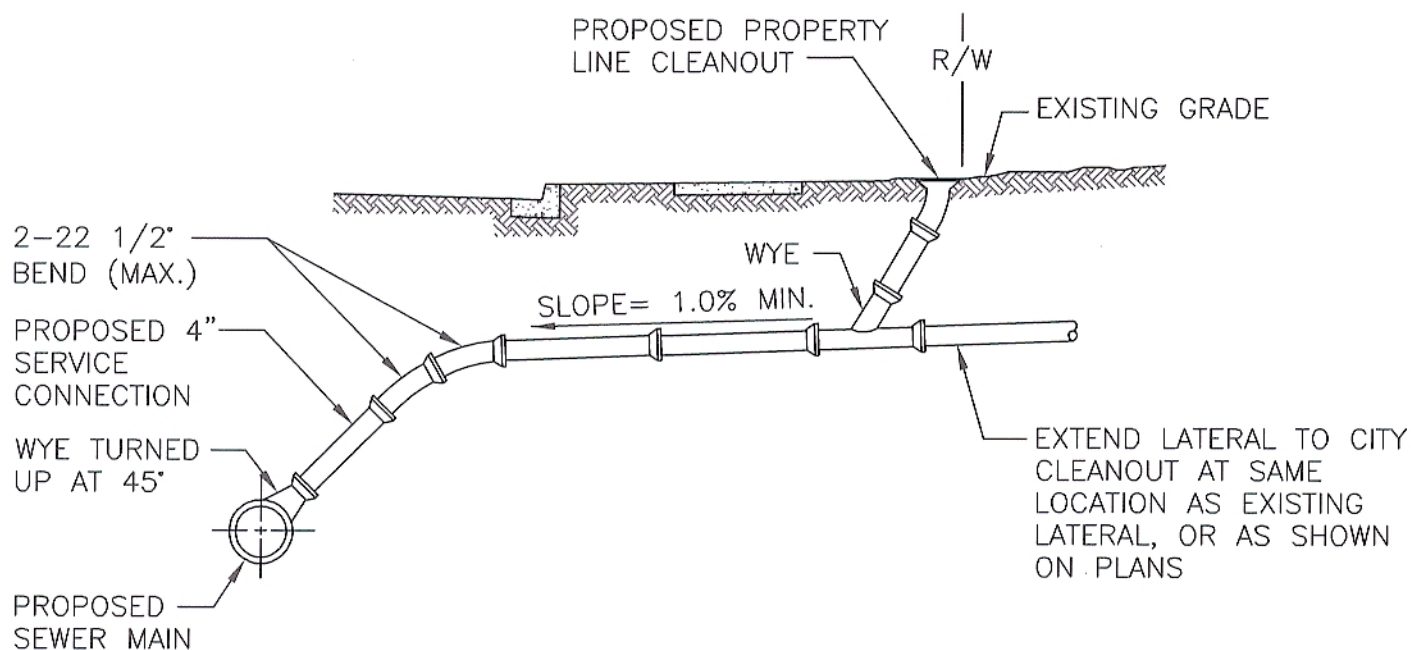
CITY OF NORFOLK – DEPARTMENT OF UTILITIES
STANDARD DETAILS

SCALE:
NOT TO SCALE

MAINLINE CLEANOUT CASTING AND COVER

DRAWING NO.
CS 10

DATE: 03/07



TYPICAL WYE/LATERAL LAYOUT

NOTE:

1. LOCATION OF WYE, CLEANOUT, AND END OF PIPE MAY BE VARIED BY INSPECTOR IF NECESSARY BECAUSE OF UNUSUAL DEPTH OR CONDITIONS. D.I. MAIN REQUIRES WYE OR TEE IN COMPLIANCE WITH A.N.S.I. A 21.10 LATEST REVISION. LATERAL PIPING SHALL MATCH MAIN LINE PIPE.
2. WHERE CONTRACTOR IS RE-CONNECTING EXIST. SANITARY LATERALS TO MAIN LINE PIPING, 2-22 1/2" BENDS SHALL BE INSTALLED TO MAKE CONNECTION IF NECESSARY. CONTRACTOR WILL BE REQUIRED TO REMOVE & REPLACE AS MUCH OF THE EXISTING LATERAL NECESSARY TO ENSURE THAT THE PROPOSED CONNECTION IS MADE IN ACCORDANCE WITH THE DETAIL AT NO ADDITIONAL COST TO THE CITY, INCLUDING MISC. RIGHT OF WAY AND PRIVATE PROPERTY IMPROVEMENTS.

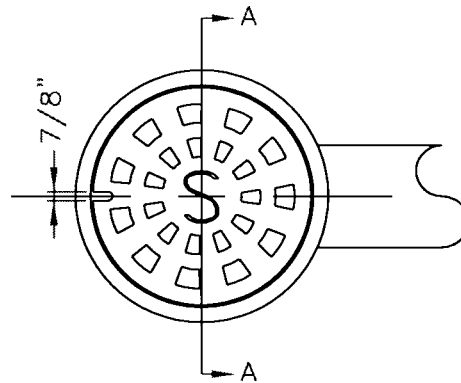
CITY OF NORFOLK – DEPARTMENT OF UTILITIES
STANDARD DETAILS

SCALE:
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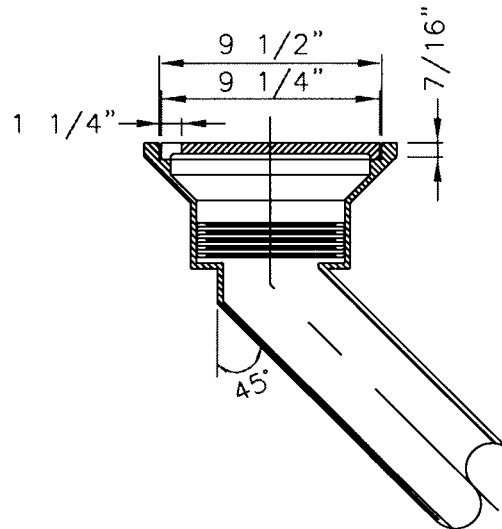
TYPICAL WYE/LATERAL LAYOUT
AND PROPERTY LINE CLEANOUT

DRAWING NO.
CS 11

DATE: 04/10



PLAN



SECTION A-A

NOTE:

1. PROPERTY LINE CLEANOUT SHALL HAVE A THREADED LATERAL CLEANOUT BOX, MEET CAST IRON-ASTM A-48 CLASS-30B REQUIREMENTS, BE FINISH-ASPHALT COATED, AND HAVE AN AVERAGE WEIGHT OF 37 LBS AS MANUFACTURED BY CAPITAL FOUNDRY ITEM NO. VB-110T-C/O OR APPROVED EQUAL.

CITY OF NORFOLK - DEPARTMENT OF UTILITIES
STANDARD DETAILS

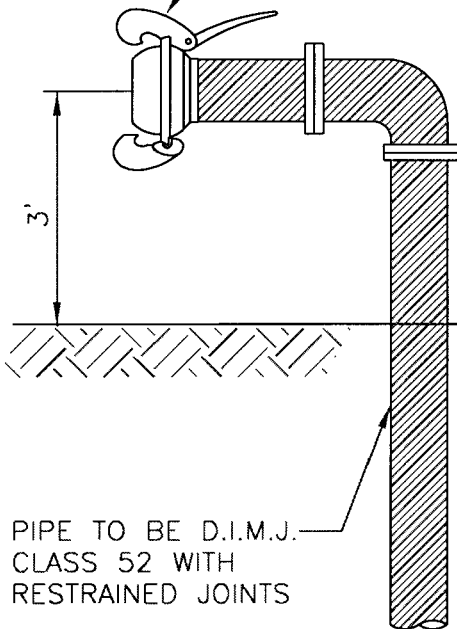
SCALE:
NOT TO SCALE

PROPERTY LINE CLEANOUT

DRAWING NO.
CS 12

DATE: 03/07

FLANGE X-BALL
COUPLING W/ CAP

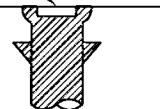


NOTES

1. PUMP CONNECTION SHALL HAVE BAUER FLANGE X-BALL QUICK DISCONNECT COUPLING PART NO. 100-7005 OR APPROVED EQUAL.

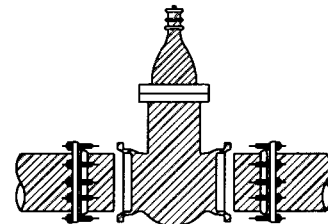
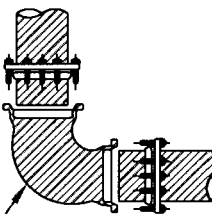
2. ALL PIPE AND FITTINGS TO BE LINED WITH PROTECTO 401 OR AN APPROVED EQUAL.

VALVE BOX
& COVER



PIPE TO BE D.I.M.J.
CLASS 52 WITH
RESTRAINED JOINTS

6" D.I.M.J.
90° BEND



DIMENSION VARIES TO
T.S. & V. OR M.J. TEE

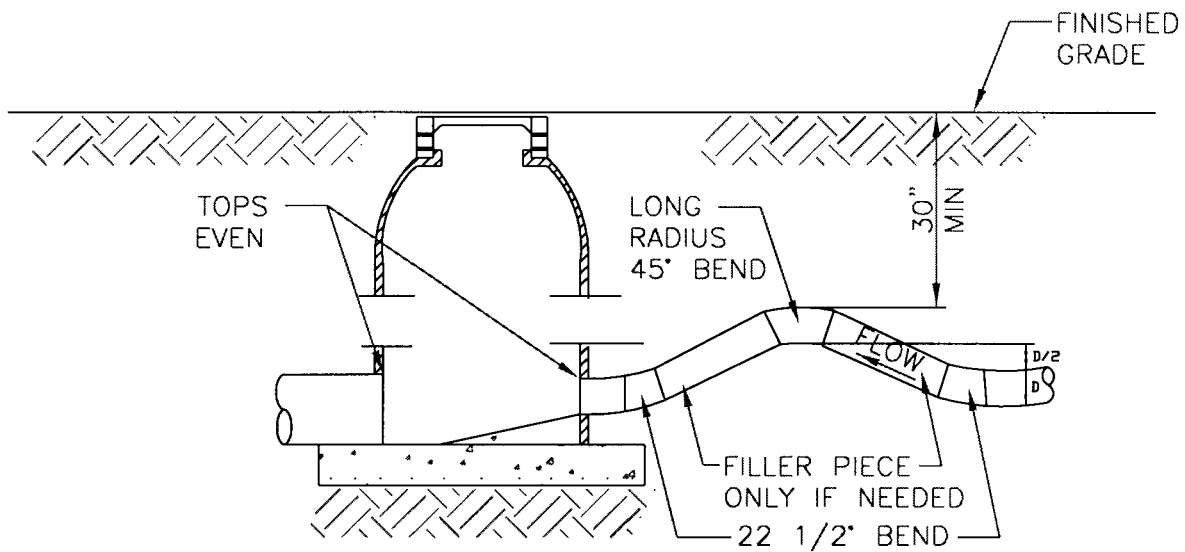
CITY OF NORFOLK – DEPARTMENT OF UTILITIES
STANDARD DETAILS

SCALE:
NOT TO SCALE

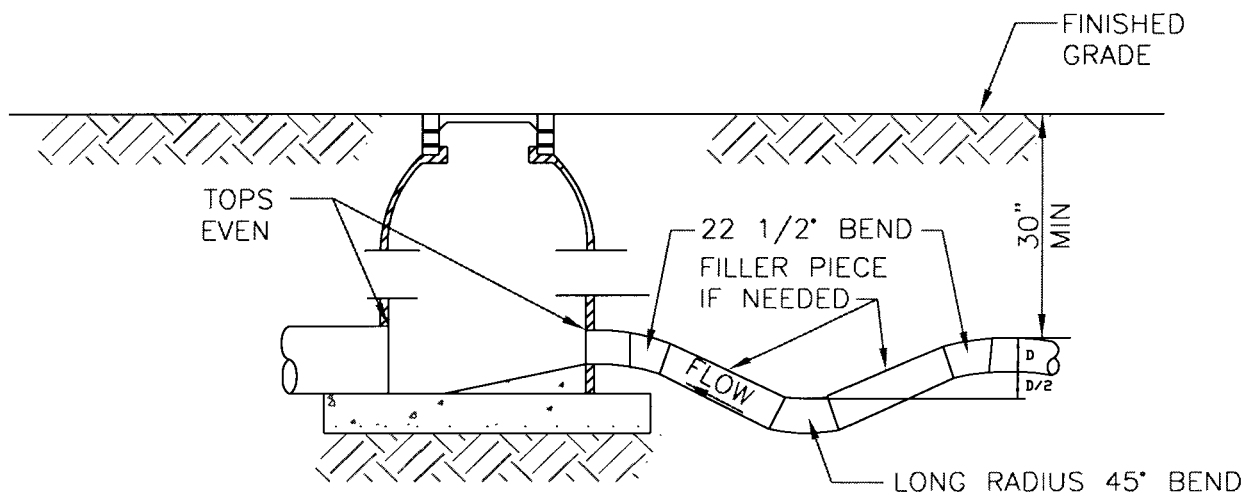
EMERGENCY PUMP CONNECTION

DRAWING NO.
CS 13

DATE: 03/07



FOR DISCHARGE INTO DEEP MANHOLE



FOR DISCHARGE INTO SHALLOW MANHOLE

MEGA-LUG OR APPROVED EQUAL
REQUIRED ON ALL BENDS

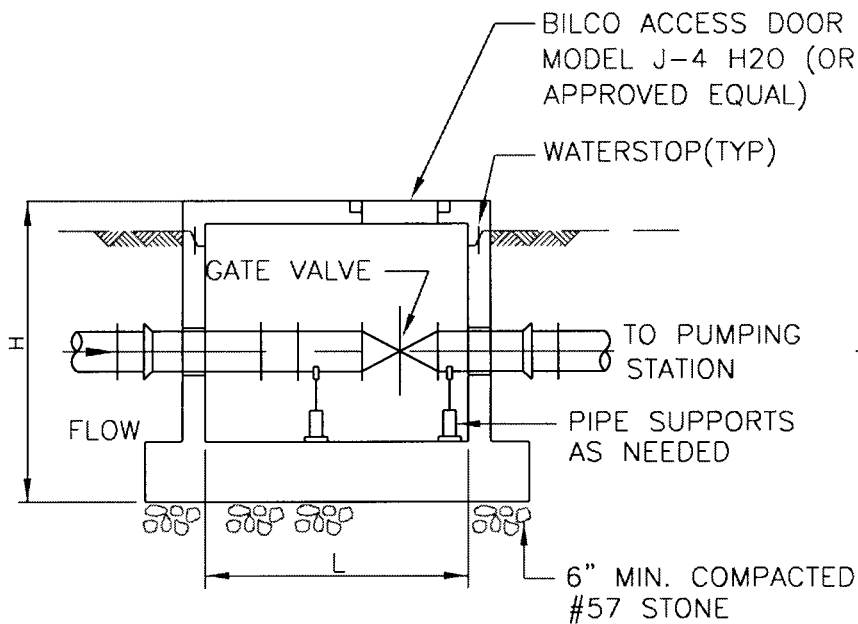
CITY OF NORFOLK – DEPARTMENT OF UTILITIES
STANDARD DETAILS

SCALE:
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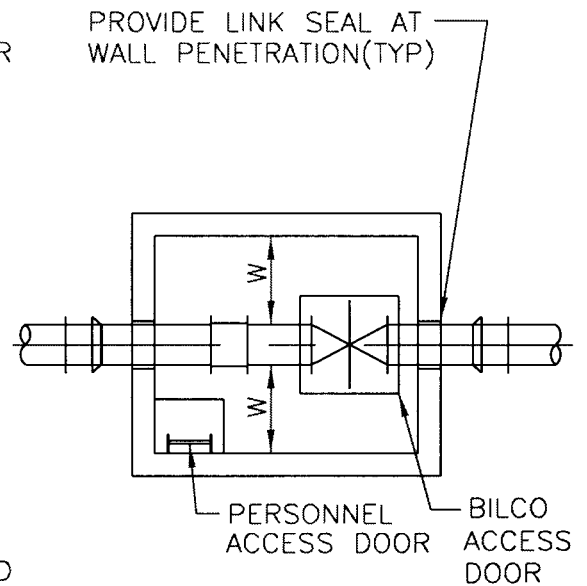
FORCE MAIN DISCHARGE CONNECTION

DRAWING NO.
CS 14

DATE: 03/07



VAULT SECTION



VAULT PLAN

NOTES:

1. PRECAST UNITS SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER PRACTICING IN THE COMMONWEALTH OF VIRGINIA.
2. PROVIDE CONCRETE WITH A MINIMUM F'C= 5000psi @ 28 DAYS
3. VAULTS SHALL BE DESIGNED FOR H2O LOADING + 1'-0" EARTH COVER + 35' IMPACT
4. "L" SHALL BE 6' FOR 12" PIPE AND SMALLER AND 8' FOR LARGER PIPE.
5. "W" SHALL BE A MINIMUM OF 2' FROM OUTSIDE DIAMETER OF VALVE OR OPERATING NUT TO VAULT WALL.
6. ACCESS DOOR SHALL BE SIZED TO ALLOW EASY ACCESS TO THE GATE VALVE OPERATING NUT. CONFIGURATION OF THE VALVE AND LOCATION OF THE HATCH VARIES DEPENDING ON SIZE AND ORIENTATION OF THE GATE VALVE.

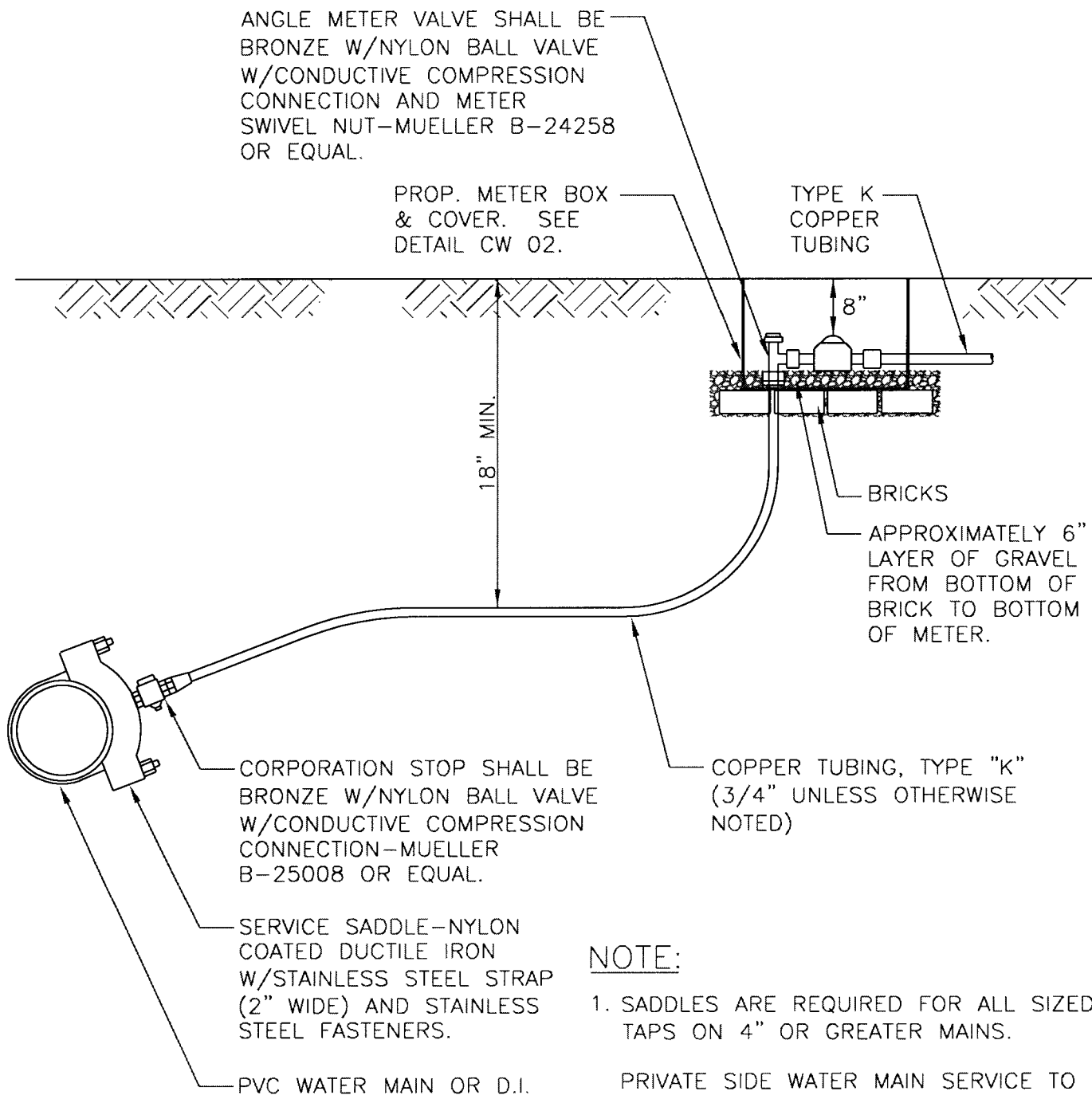
CITY OF NORFOLK – DEPARTMENT OF UTILITIES
STANDARD DETAILS

SCALE:
NOT TO SCALE

PRECAST CONCRETE VALVE VAULT

DRAWING NO.
CS 15

DATE: 03/07



NOTE:

1. SADDLES ARE REQUIRED FOR ALL SIZED TAPS ON 4" OR GREATER MAINS.

2. PRIVATE SIDE WATER MAIN SERVICE TO BE CHECKED FOR PRESENCE OF LEAD AT NO ADDITIONAL COST.

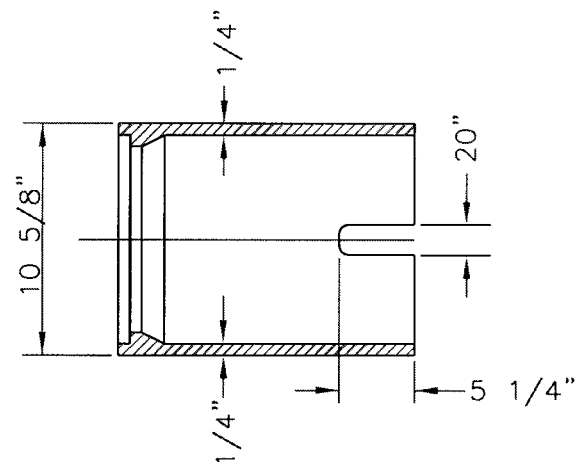
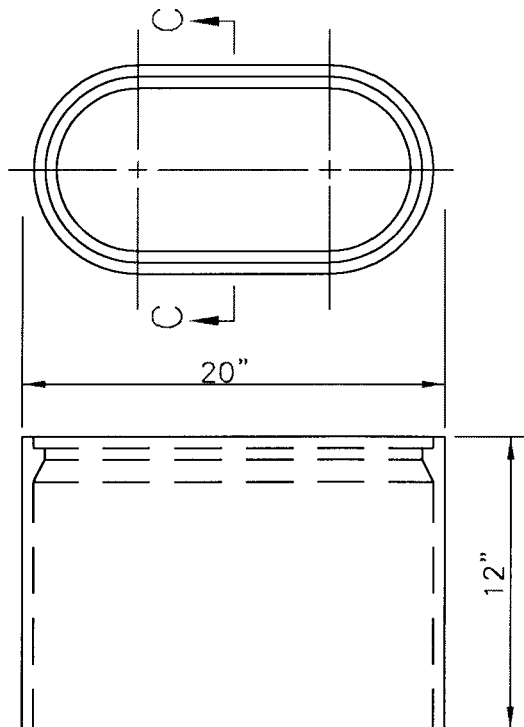
CITY OF NORFOLK – DEPARTMENT OF UTILITIES
STANDARD DETAILS

SCALE:
NOT TO SCALE

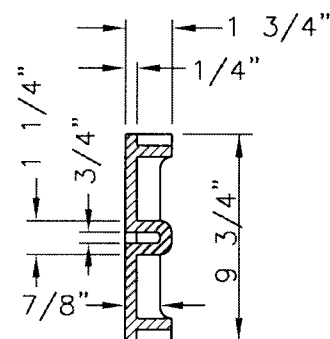
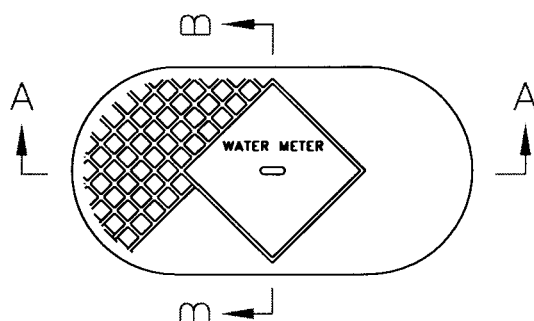
TYPICAL TAP INSTALLATION

DRAWING NO.
CW 01

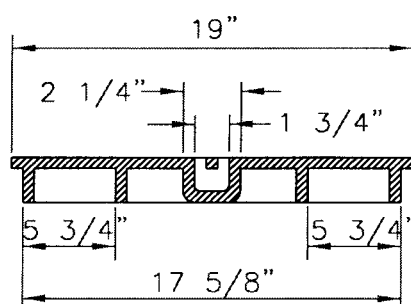
DATE: 07/07



SECTION C-C



SECTION B-B



SECTION A-A

GENERAL SPECIFICATIONS:

1. CAST IRON SHALL BE 35,000 P.S.I.
2. ASTM A-48 CLASS 35B

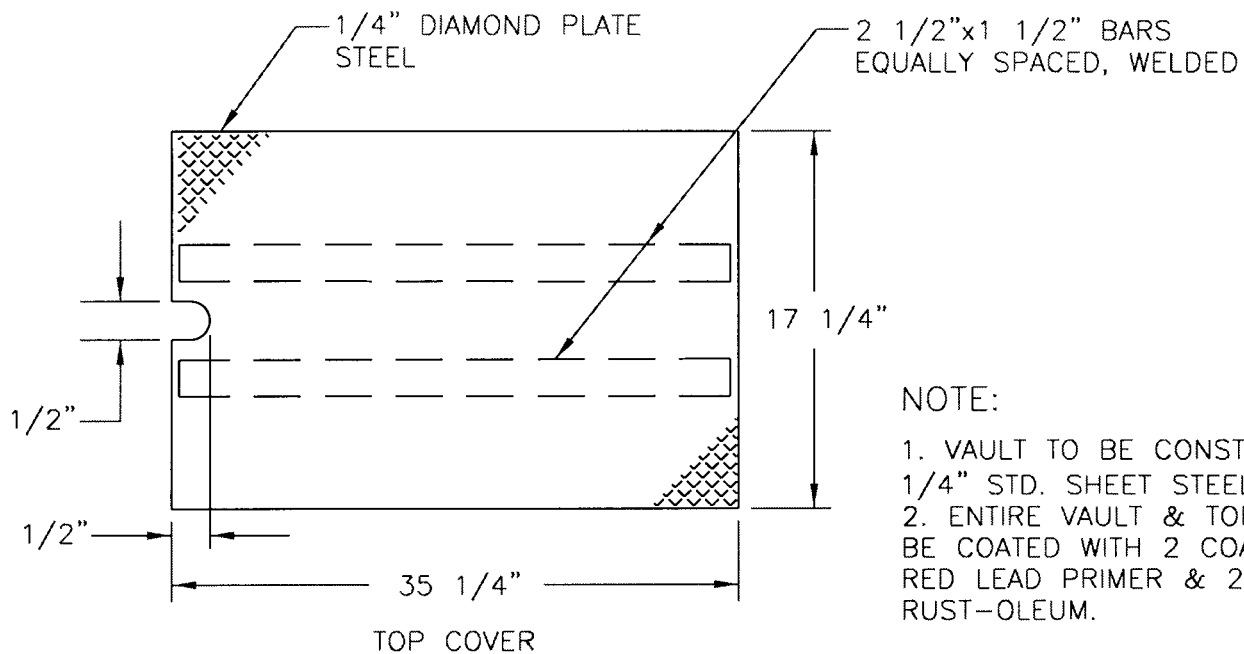
CITY OF NORFOLK – DEPARTMENT OF UTILITIES
STANDARD DETAILS

SCALE:
NOT TO SCALE

WATER METER BOX & COVER

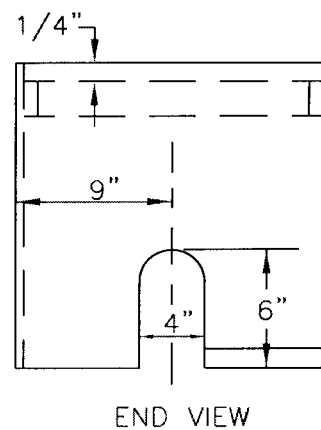
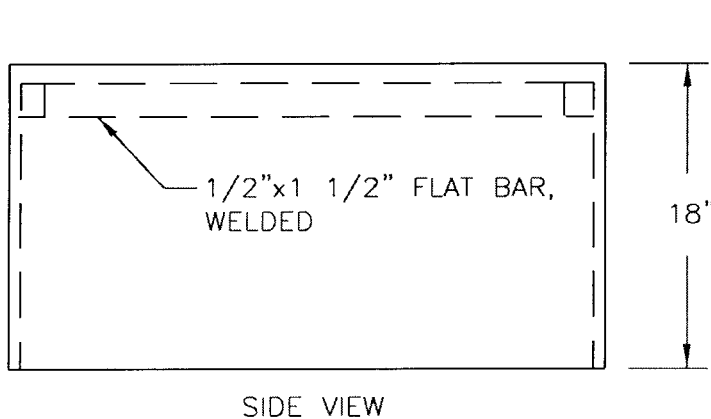
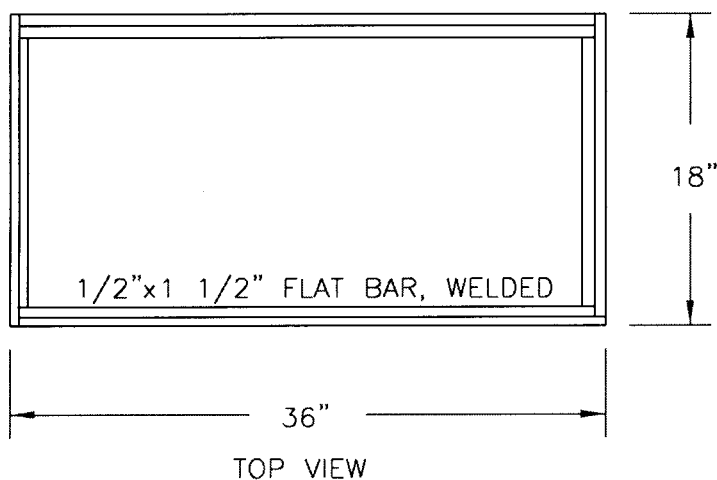
DRAWING NO.
CW 02

DATE: 03/07



NOTE:

1. VAULT TO BE CONSTRUCTED OF 1/4" STD. SHEET STEEL.
2. ENTIRE VAULT & TOP TO BE COATED WITH 2 COATS RED LEAD PRIMER & 2 COATS RUST-OLEUM.



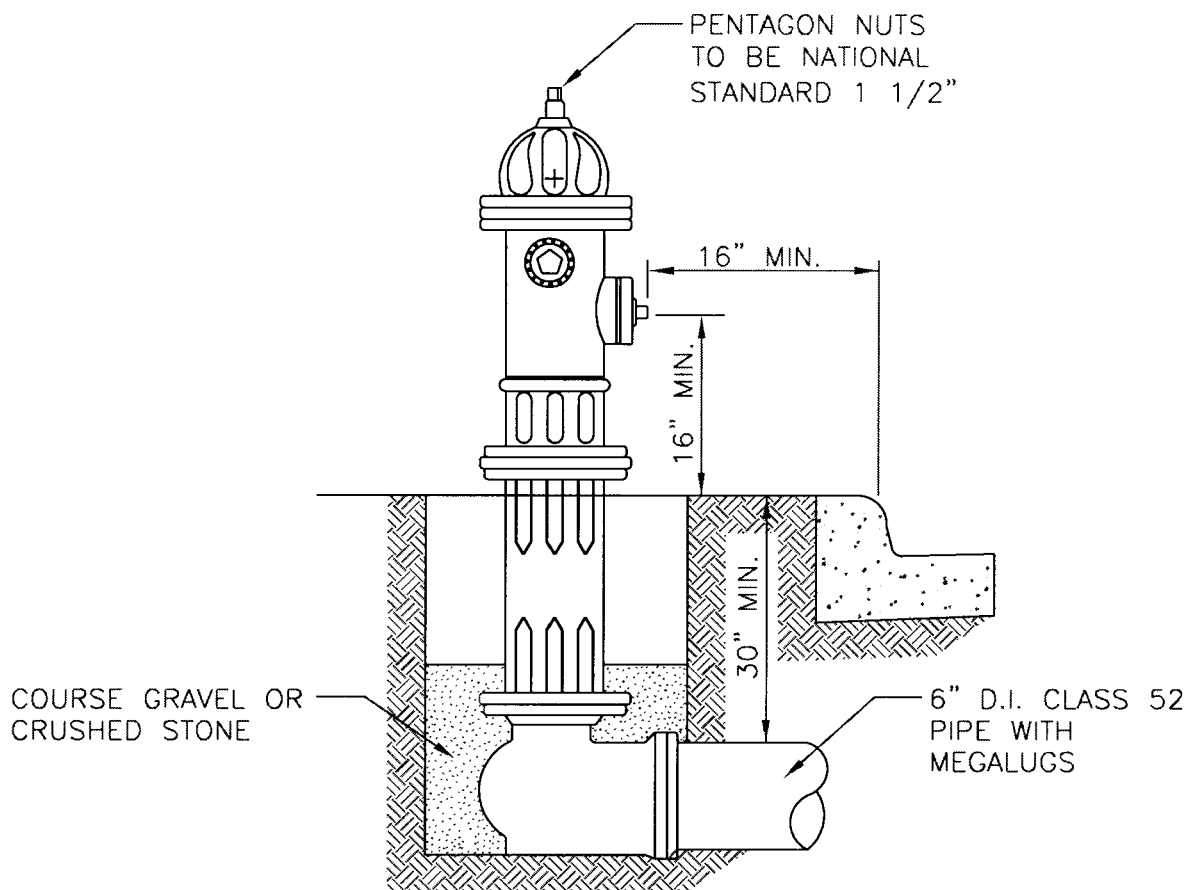
CITY OF NORFOLK – DEPARTMENT OF UTILITIES
STANDARD DETAILS

SCALE:
NOT TO SCALE

WATER METER VAULT & TOP

DRAWING NO.
CW 03

DATE: 03/07



NOTES:

1. HYDRANTS TO BE SET WITH BURY LINE POSITIONED AT GRADE WITH NOZZLES AT MIN. OF 16 INCHES ABOVE GROUND.
2. WHEN SET BEHIND CURB THE NOZZLES ARE TO BE PARALLEL OR AT RIGHT ANGLES TO THE CURB, WITH THE PUMPER NOZZLE FACING THE CURB. THE PUMPER NOZZLE WILL BE A MIN. DISTANCE OF 16 INCHES FROM THE FACE OF THE CURB.
3. HYDRANT MUST HAVE SAFETY BREAKAWAY FEATURE SUCH AS MUELLER CENTURIAN 250 A421 OR APPROVED EQUAL.
4. 6" DUCTILE IRON CLASS 52 FROM TEE TO HYDRANT. VALVE TO BE RODDED TO TEE. VALVE & HYDRANT TO HAVE MEGALUGS.
5. COARSE GRAVEL OR CRUSHED STONE IS TO BE PLACED FROM THE BOTTOM OF THE TRENCH TO AT LEAST 6 INCHES ABOVE THE DRAIN OPENINGS IN THE HYDRANT AND AT A DISTANCE OF ONE FOOT AROUND THE ELBOW.

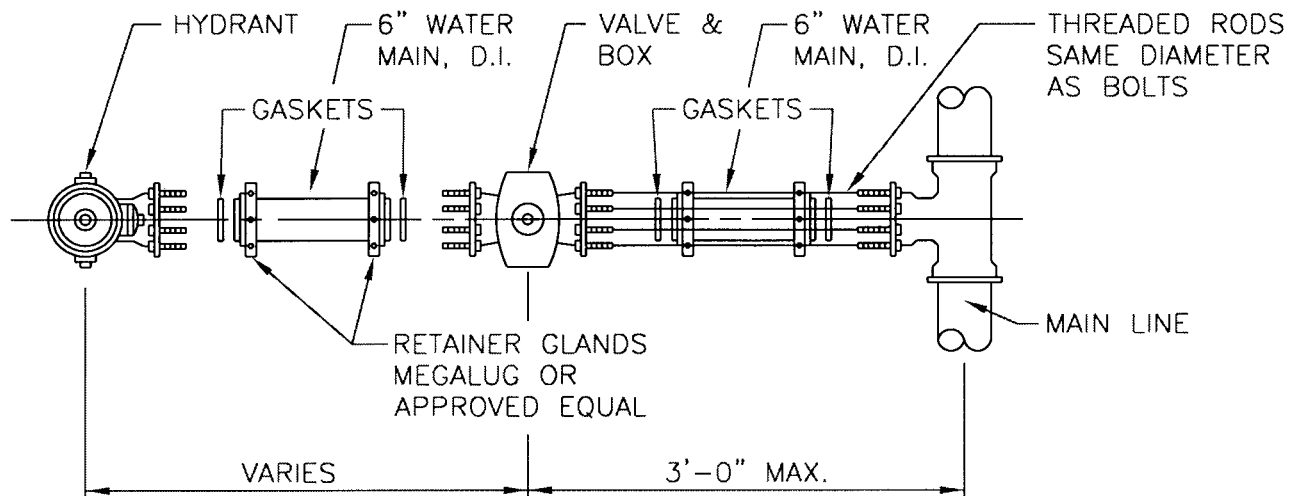
CITY OF NORFOLK – DEPARTMENT OF UTILITIES
STANDARD DETAILS

SCALE:
NOT TO SCALE

FIRE HYDRANT INSTALLATION

DRAWING NO.
CW 04

DATE: 03/07



NOTE:

1. ALL HYDRANT CONNECTIONS MUST BE FIELD INSPECTED, BY A CITY INSPECTOR, PRIOR TO BACKFILLING.
2. ALL PIPE BETWEEN TEE AND FIRE HYDRANT SHALL BE DUCTILE IRON CLASS 52. VALVE SHALL BE RODDED TO SERVICE TEE. VALVE AND HYDRANT SHALL HAVE MEGALUGS OR APPROVED EQUAL.

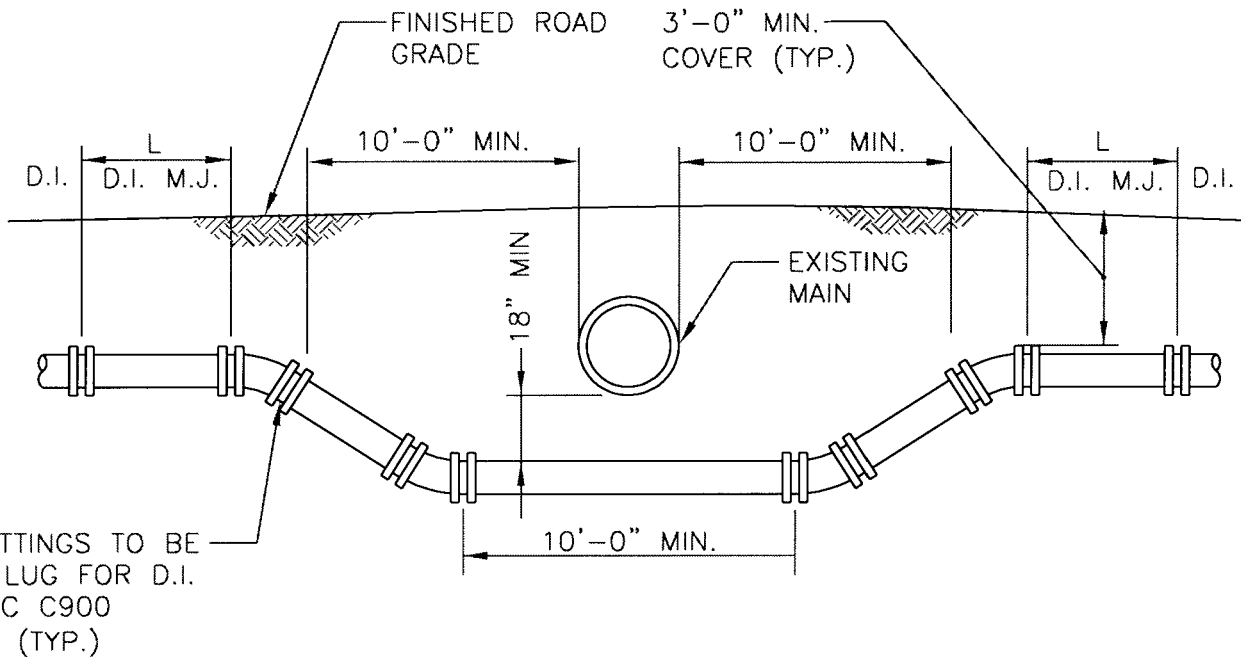
CITY OF NORFOLK – DEPARTMENT OF UTILITIES
STANDARD DETAILS

SCALE:
NOT TO SCALE

FIRE HYDRANT CONNECTION

DRAWING NO.
CW 05

DATE: 03/07



NOTES:

1. LOWERED SECTION TO BE OF DUCTILE IRON CLASS 52 MECHANICAL JOINT PIPE OR PVC C-900 OR PVC C-905 PIPE WITH RESTRAINED JOINTS.
2. THE DESIGN ENGINEER SHALL CALCULATE LENGTH (L) OF RESTRAINED SECTION.
3. USE APPROPRIATE TYPE RESTRAINT FOR DUCTILE IRON OR PVC.

CITY OF NORFOLK – DEPARTMENT OF UTILITIES
STANDARD DETAILS

SCALE:
NOT TO SCALE

LOWERING WATER MAIN OR NEW CONSTRUCTION

DRAWING NO.
CW 06

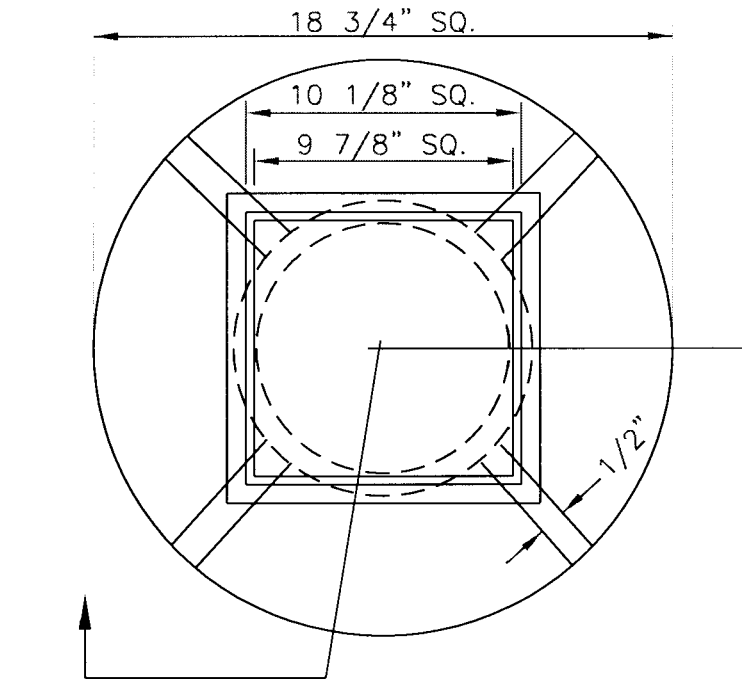
DATE: 03/07

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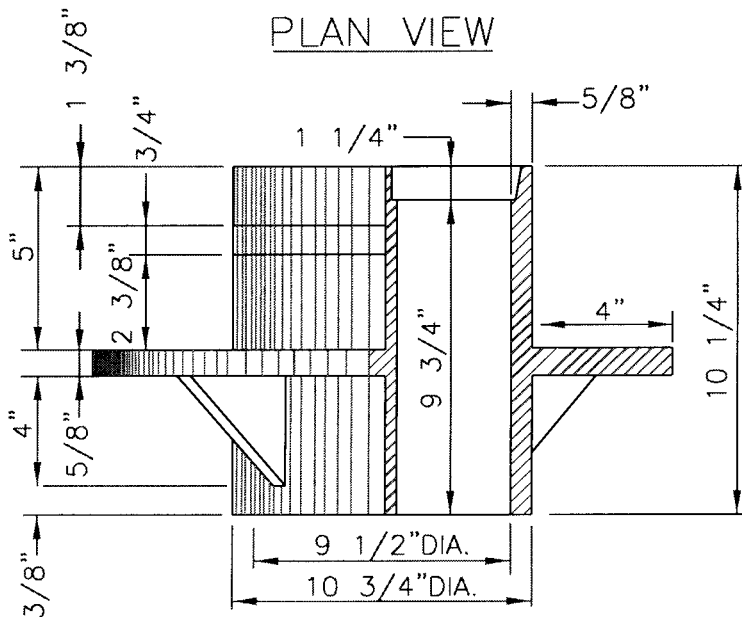
1. LETTER ON COVER SHALL BE "S" WHEN USED IN SAN. SEWER SYSTEM AND "W" WHEN USED IN WATER SYSTEM.
2. RISER FOR VALVE BOX SHALL MATCH TYPE OF PIPE USED FOR MAIN.

GENERAL SPECIFICATIONS

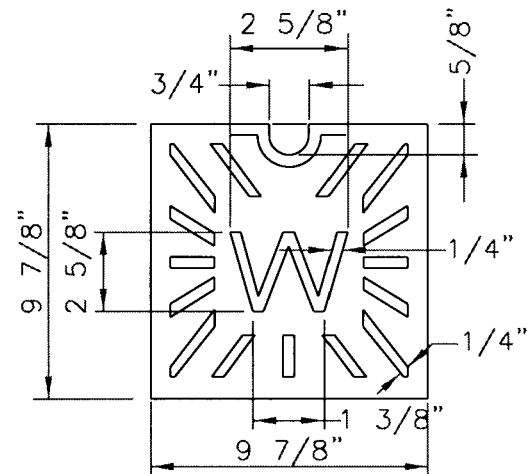
1. CAST IRON SHALL BE 35,000 PSI
2. ASTM A48 CLASS 35B



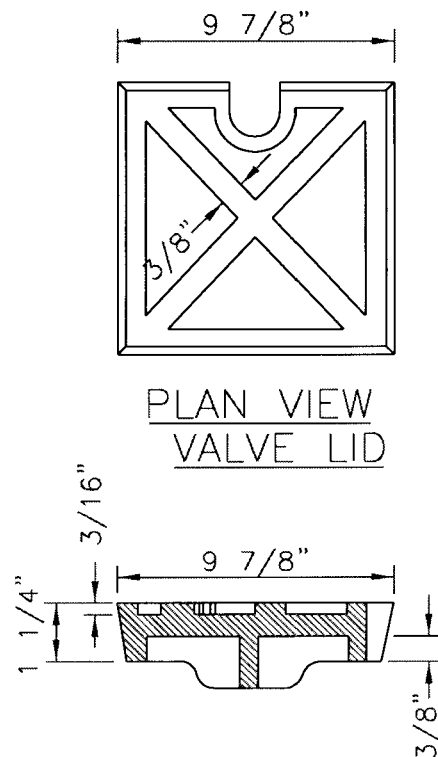
PLAN VIEW



PROFILE
VALVE BOX



PLAN VIEW
VALVE LID



PROFILE
VALVE LID

CITY OF NORFOLK – DEPARTMENT OF UTILITIES
STANDARD DETAILS

SCALE:
NOT TO SCALE

LARGE VALVE BOX
FOR MAINS 8 INCHES AND LARGER

DRAWING NO.
CWS 01

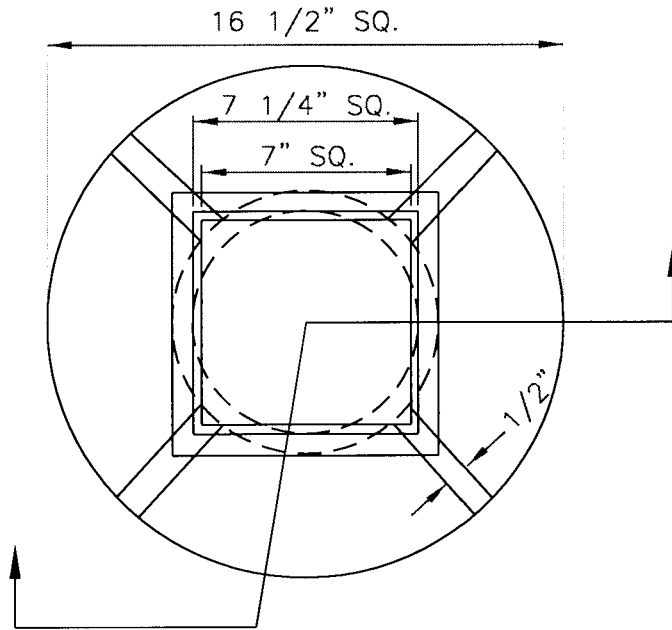
DATE: 03/07

NOTE:

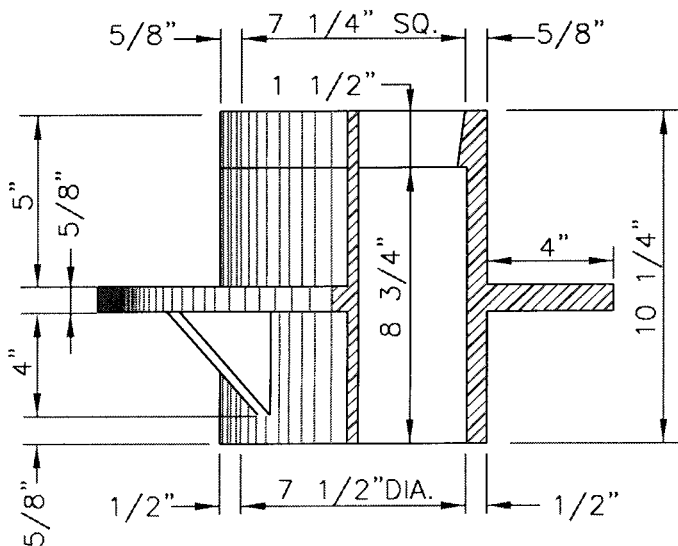
1. LETTER ON COVER SHALL BE "S" WHEN USED IN SAN. SEWER SYSTEM AND "W" WHEN USED IN WATER SYSTEM.
2. RISER FOR VALVE BOX SHALL MATCH TYPE OF PIPE USED FOR MAIN.

GENERAL SPECIFICATIONS

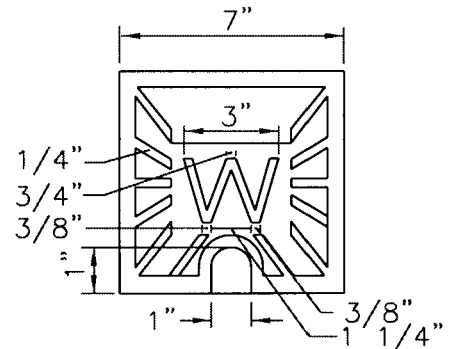
1. CAST IRON SHALL BE 35,000 PSI
2. ASTM A48 CLASS 35B



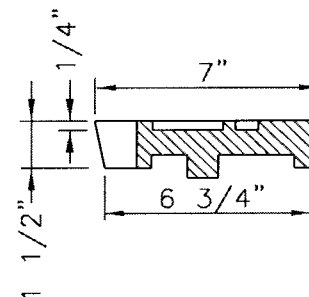
PLAN VIEW



PROFILE
VALVE BOX



PLAN VIEW
VALVE LID



PROFILE
VALVE LID

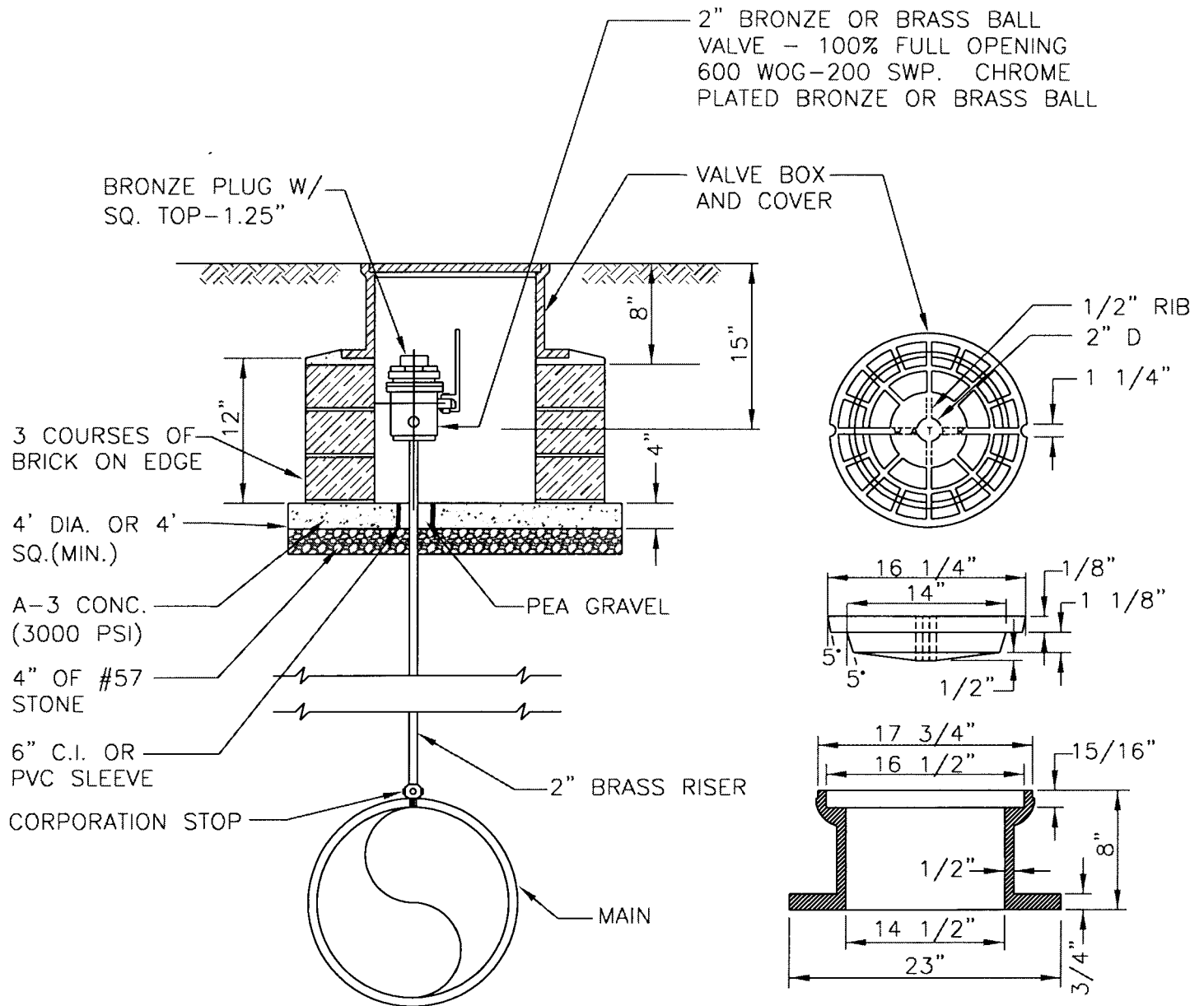
CITY OF NORFOLK – DEPARTMENT OF UTILITIES
STANDARD DETAILS

SMALL GATE VALVE BOX
FOR MAINS UP TO 6 INCHES

SCALE:
NOT TO SCALE

DRAWING NO.
CWS 02

DATE: 03/07



NOTES:

1. GRAVEL BEDDING MAY BE USED IN PLACE OF CONCRETE IN NON-TRAFFIC AREA AT DISCRETION OF ENGINEER.
2. MACHINE SEATING SURFACES ON BOTH COVER & FRAME.
2. ALL CASTINGS TO BE DIPPED IN ASPHALTIC PAINT AFTER MACHINING
3. TOLERANCE TO BE $\pm 0.125"$ FOR ALL DIMENSIONS.
4. CASTING TO BE SHOT BLASTED.
5. CASTINGS TO BE ASTM A48 CLASS 35B.

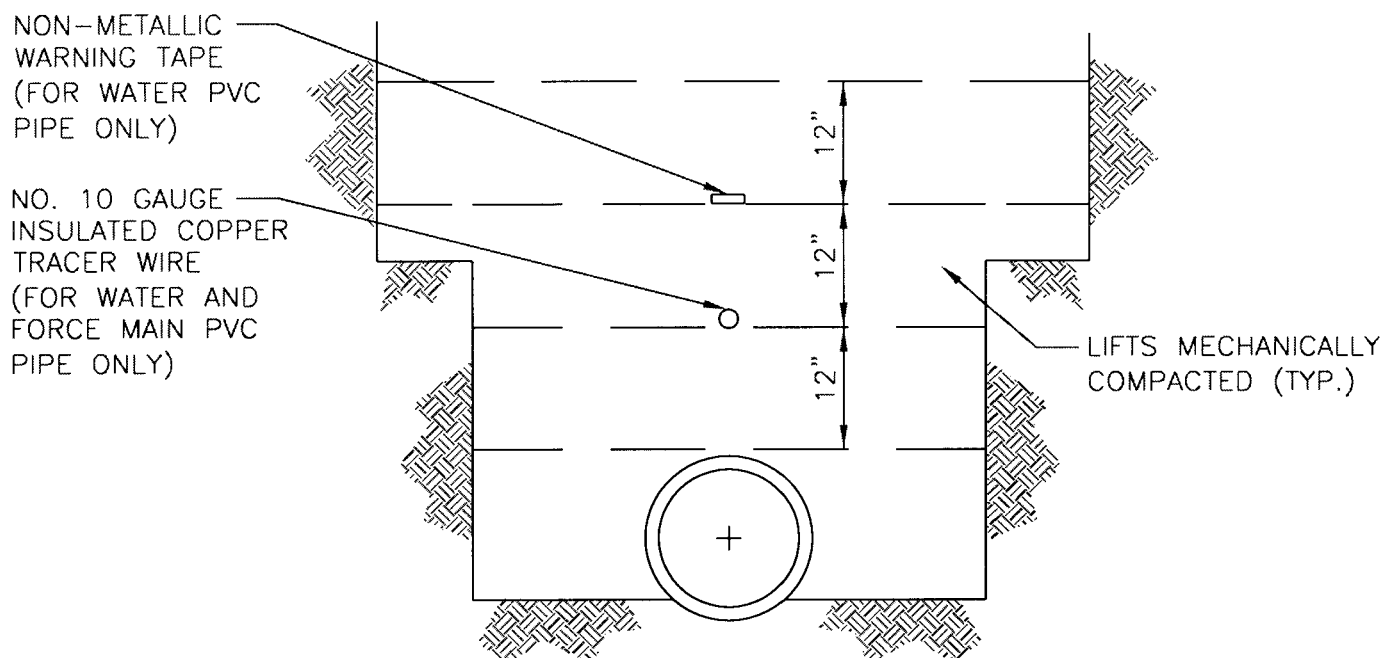
CITY OF NORFOLK - DEPARTMENT OF UTILITIES
STANDARD DETAILS

SCALE:
NOT TO SCALE

AIR VENT / BLOW-OFF VALVE

DRAWING NO.
CWS 03

DATE: 03/07



PVC PIPE (WATER):

1. BACKFILL WITH ACCEPTABLE MATERIAL TO 12" ABOVE CROWN OF PIPE. COMPACT BY MECHANICAL MEANS.
2. PLACE NO. 10 GAUGE INSULATED COPPER TRACER WIRE. SECURE BY PLACING ACCEPTABLE FILL MATERIAL BY HAND. TRACER WIRE TO BE LOOPED INTO VALVE BOXES FOR TRACING PURPOSES.
3. BACKFILL WITH ACCEPTABLE MATERIAL TO 12" ABOVE TRACER WIRE. COMPACT BY MECHANICAL MEANS.
4. PLACE NON-METALLIC WARNING TAPE. SECURE BY PLACING ACCEPTABLE FILL MATERIAL BY HAND.
5. BACKFILL REMAINING TRENCH IN 12" LIFTS, COMPACT BY MECHANICAL MEANS, UP TO BOTTOM OF PAVEMENT SECTION.
6. PLACE TEMPORARY OR PERMANENT PAVEMENT.

PVC/DUCTILE IRON PIPE(SEWER) AND DUCTILE IRON PIPE(WATER):

1. BACKFILL IN 12" LIFTS TO BOTTOM OF PAVEMENT SECTION. EACH LIFT TO BE MECHANICALLY COMPACTED.
2. PLACE TEMPORARY OR PERMANENT PAVEMENT.

* THE CITY MAY CONDUCT COMPACTION TESTING AT ANY POINT DURING THE BACKFILL PROCESS.

CITY OF NORFOLK – DEPARTMENT OF UTILITIES
STANDARD DETAILS

SCALE:
NOT TO SCALE

BACKFILL METHODS

DRAWING NO.
CWS 04

DATE: 03/07

TABLE II

REQUIRED COVER OVER PIPE.

NOMINAL SIZE OF DI PIPE	REQUIRED COVER OVER PIPE (INCH)
2"	30
3"	30
4"	30
6"	30
8"	36
12"	36
16"	36
18"	36
20"	36
24"	42
30"	42
36"	42
42"	42

NOTE:

1. THE MINIMUM COVER OVER PIPES SHALL BE AS SHOWN IN TABLE NO. II FOR WATER MAINS AND SEWER FORCE MAINS INSTALLED IN THE CITY OF NORFOLK, EXCEPT WHEN SUCH CONDITIONS EXIST. TO PREVENT THIS COVER FROM BEING OBTAINED, IN WHICH EVENT THE AMOUNT OF COVER SHALL BE DETERMINED BY THE ENGINEER. THE AMOUNT OF COVER SHALL BE MEASURED FROM THE PROPOSED GRADE OF THE STREET OR THE EXISTING GRADE WHICH EVER MAY BE THE LOWER.
2. ALL VALVES SMALLER THAN 12" DIAMETER SHALL BE GATE VALVES.
3. ALL WATER VALVES SHALL BE OPEN RIGHT, 12" DIAMETER OR LARGER SHALL BE HORIZONTAL GATE OR BUTTERFLY VALVES.
4. ALL SEWER VALVES SHALL BE OPEN LEFT GATE VALVES, 12" AND LARGER SHALL BE HORIZONTAL.

	CITY OF NORFOLK – DEPARTMENT OF UTILITIES STANDARD DETAILS	SCALE: NOT TO SCALE
	REQUIRED COVER OVER PIPE	DRAWING NO. CWS 05
DATE: 03/07		

TABLE I

MAXIMUM PERMISSABLE DEFLECTION (INCHES)				APPROX. RADIUS OF CURVE PRODUCED BY SUCCESSION OF JOINTS (FEET).			
NOMINAL SIZE OF PIPE (INCH)	16 FT LENGTH	18 FT LENGTH	20 FT LENGTH	12 FT LENGTH	16 FT LENGTH	18 FT LENGTH	20 FT LENGTH
4	28	31		85	110	125	
6	24	27		100	130	145	
8	18	20		130	170	195	
10	18	20		130	170	195	
12	18	20	22	130	170	195	220
14	12	13.5	15	190	250	285	320
16	12	13.5	15	190	250	285	320
18	10	11	12	230	300	340	380
20	10	11	12	230	300	340	380
24	8	9	10	300	400	450	500
30	8	9	10	300	400	450	500
36	7	8		330	440	500	
42	6	7.5		340	450	510	
48	6	7.5		340	450	510	

NOTE:

1. MAXIMUM ALLOWABLE DEFLECTION SHALL BE 50% OF MANUFACTURERS RECOMMENDED DEFLECTION.

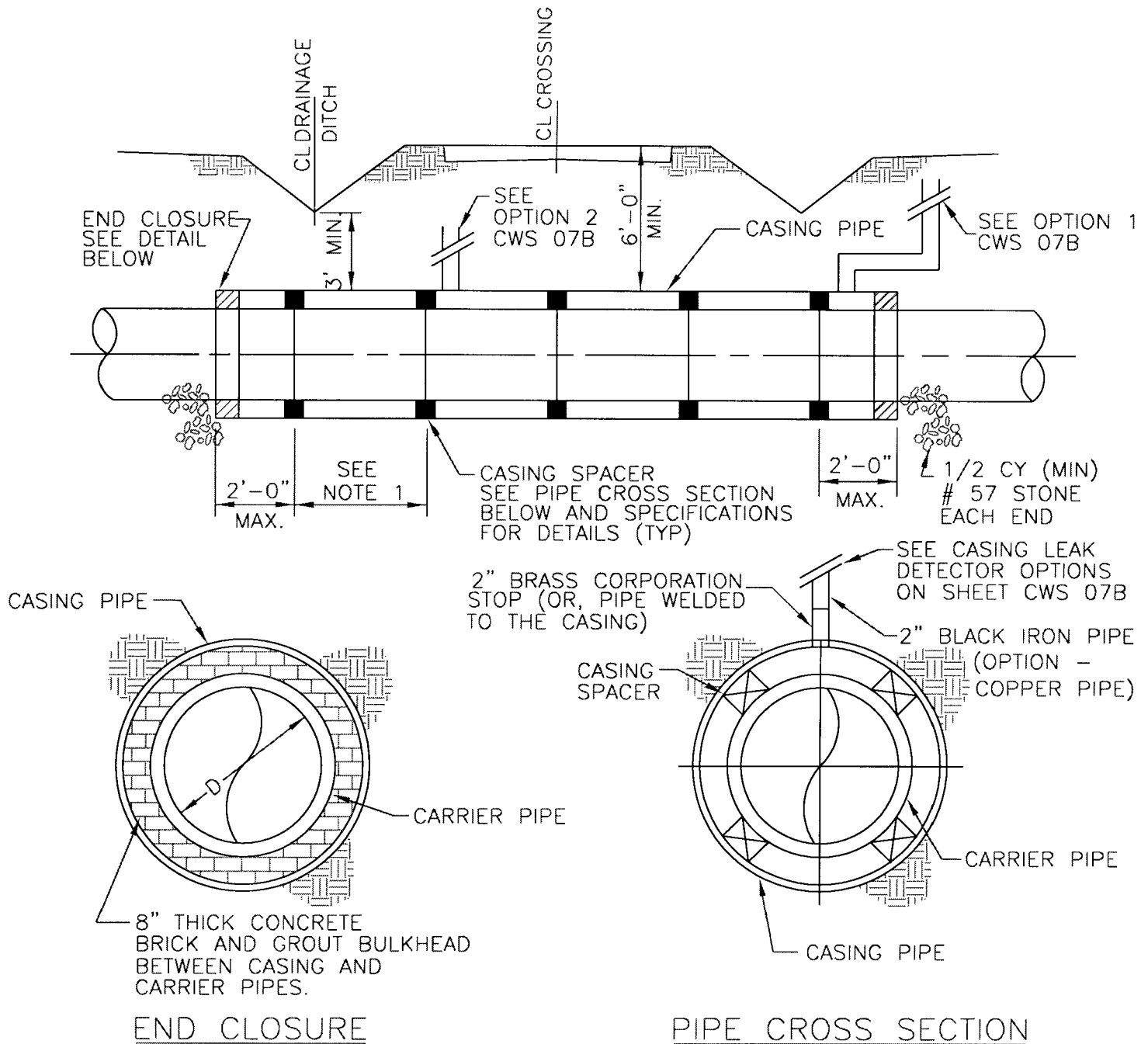
CITY OF NORFOLK – DEPARTMENT OF UTILITIES
STANDARD DETAILS

SCALE:
NOT TO SCALE

MAXIMUM PERMISSIBLE DEFLECTION IN LAYING
MECHANICAL-JOINT PIPE

DRAWING NO.
CWS 06

DATE: 03/07



NOTES:

1. PROVIDE FOUR POINT CASEING PIPE SUPPORT FOR EACH PIPELINE SECTION. CENTER SPACERS SHALL BE CENTERED BETWEEN OUTSIDE SPACERS, OUTSIDE SPACERS SHALL BE 1'-0" FROM JOINT.
2. CARRIER PIPE SHALL BE MECHANICAL RESTRAINED JOINT DUCTILE IRON PIPE CLASS 52.
3. FOR CASEING SIZES AND ALLOWABLE MATERIALS, SEE FIGURE CS 40B
4. PROVIDE STAINLESS STEEL SPACERS WITH UHMW RUNNERS. ELECTRICALLY ISOLATE CARRIER PIPE FROM CASEING PIPE.

CITY OF NORFOLK – DEPARTMENT OF UTILITIES
STANDARD DETAILS

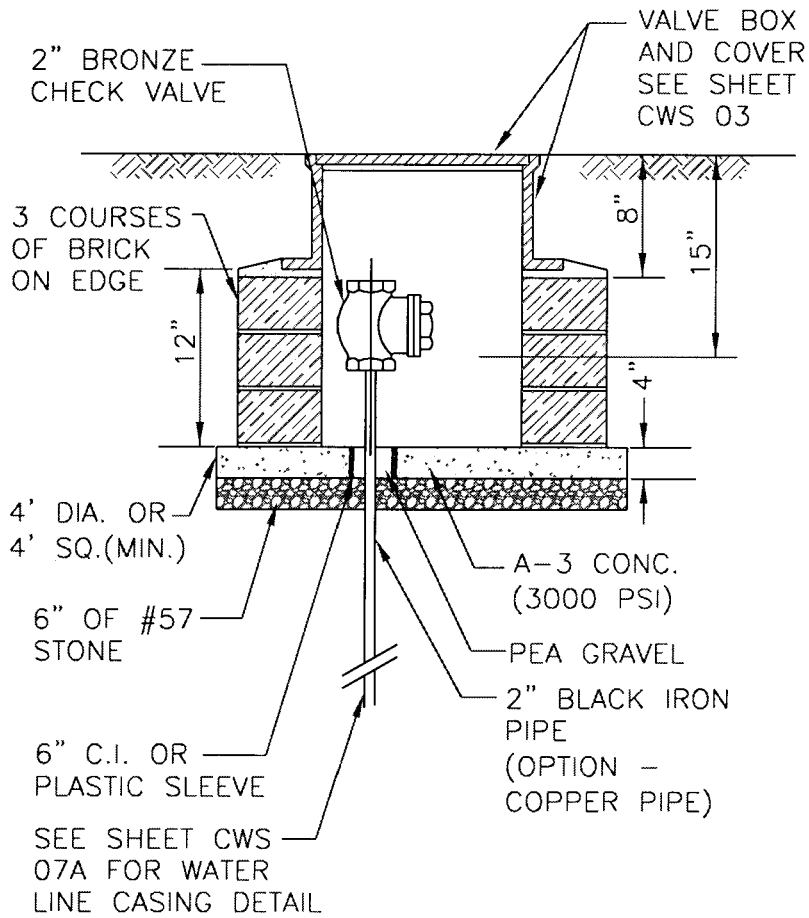
SCALE:
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WATER LINE CASING

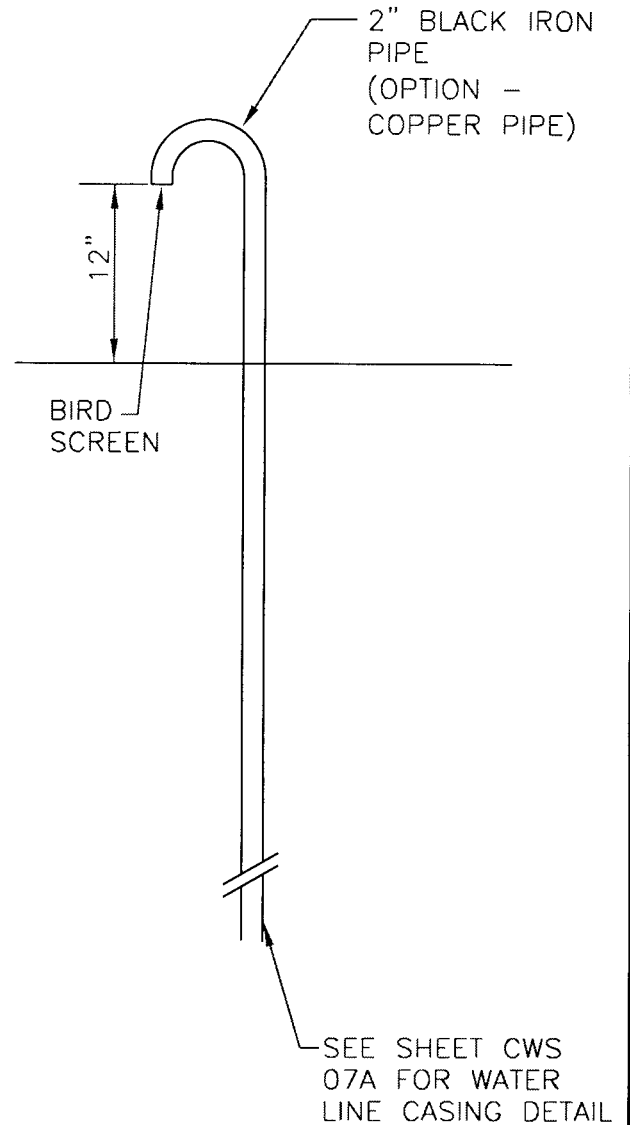
DRAWING NO.
CWS 07A

DATE: 07/07

OPTION 2



OPTION 1



NOTES:

1. MACHINE SEATING SURFACES ON BOTH COVER & FRAME.
2. ALL CASTINGS TO BE DIPPED IN ASPHALTIC PAINT AFTER MACHINING
3. TOLERANCE TO BE $\pm 0.125"$ FOR ALL DIMENSIONS.
4. CASTING TO BE SHOT BLASTED.
5. CASTINGS TO BE ASTM A48 CLASS 35B.

CITY OF NORFOLK - DEPARTMENT OF UTILITIES
STANDARD DETAILS

SCALE:
NOT TO SCALE

CASING LEAK DETECTOR OPTIONS 1 & 2

DRAWING NO.
CWS 07B

DATE: 07/07

CASING PIPE REQUIREMENTS						
CARRIER PIPE DIA.	MINIMUM CASING PIPE DIA.	MINIMUM WALL THICKNESS				
		CRITERIA WITHIN RAILROAD RIGHT OF WAY		CRITERIA WITHIN CITY OR VDOT RIGHT OF WAY		MINIMUM NUMBER OF CASING SPACER RUNNERS
		R.C.P. PROTECTIVE COATING	STEEL WITH PROTECTIVE COATING	R.C.P.	STEEL	
4"	12"	3.0	0.375	3.0	0.250	4
6"	18"	3.0	0.375	3.0	0.250	4
8"	18"	3.0	0.375	3.0	0.250	4
10"	20"	3.0	0.375	3.0	0.250	4
12"	24"	3.5	0.375	3.5	0.250	4
16"	30"	4.0	0.500	4.0	0.375	6
18"	30"	4.0	0.500	4.0	0.375	6
20"	36"	4.5	0.563	4.5	0.375	6
24"	42"	5.0	0.625	5.0	0.500	6

NOTES:

1. SLOPE CASING PIPE AT MINIMUM GRADE OF 1/16" PER FOOT
2. PROVIDE LEAK DETECTION PER DETAIL
3. OPTION 1 OR OPTION 2 AT DISCRESSION OF ENGINEERING
4. INCREASING THICKNESS OF CASING MUST BE CONSIDERED WHERE BORE LENGTHS EXCEED 125 FEET.

	CITY OF NORFOLK – DEPARTMENT OF UTILITIES STANDARD DETAILS	SCALE: NOT TO SCALE
	WATER & FM CASING REQUIRMENTS	DRAWING NO. CWS 07C

DATE: 07/07